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AERO DIGEST

I N C L U D I N G

AVIATION ENGINEERING



FRANK HAWKS

. . . sets a New Non-Stop

TRANSCONTINENTAL SPEED RECORD



International News Photo

LIEUTENANT-COMMANDER FRANK HAWKS established a new non-stop transcontinental speed record on June 2, 1933, when he flew from Los Angeles to New York in 13 hours and 27 minutes—lowering his previous record by four hours.

Hawks' low-wing Northrop monoplane, Texaco "Sky Chief," is powered by a WRIGHT (14-cylinder) WHIRLWIND—the first 14-cylinder engine to establish an endurance speed record.

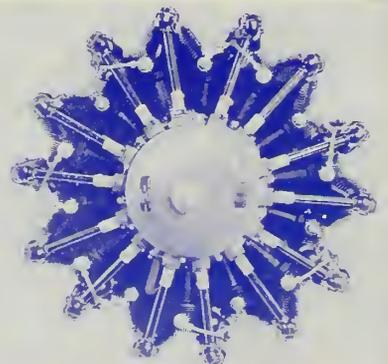
The WRIGHT WHIRLWIND double-row, radial, air-cooled engine was originally developed for the United States Navy to increase the speed of high-performance naval aircraft. It is now installed in many advanced models of this type.

In the commercial field, the 14-cylinder WHIRLWIND is now available for domestic sale to manufacturers of high-speed transports and American airline operators.

WRIGHT (14-CYLINDER) WHIRLWIND

*First 14-cylinder engine to establish an
Endurance Speed Record*

Hawks flew at 15,000 feet most of the 2440 miles across the continent. Although the 14-cylinder WHIRLWIND is designed for high-altitude performance, the engine is capable of developing 700 h.p. at sea level.



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RCA Victor Company, Inc.

Aviation Radio Section

CAMDEN, N. J.

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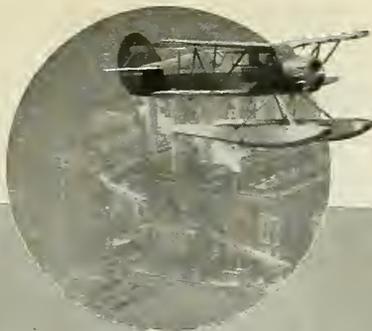
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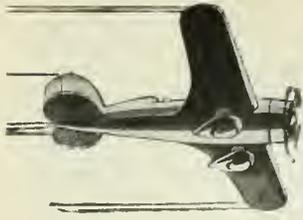
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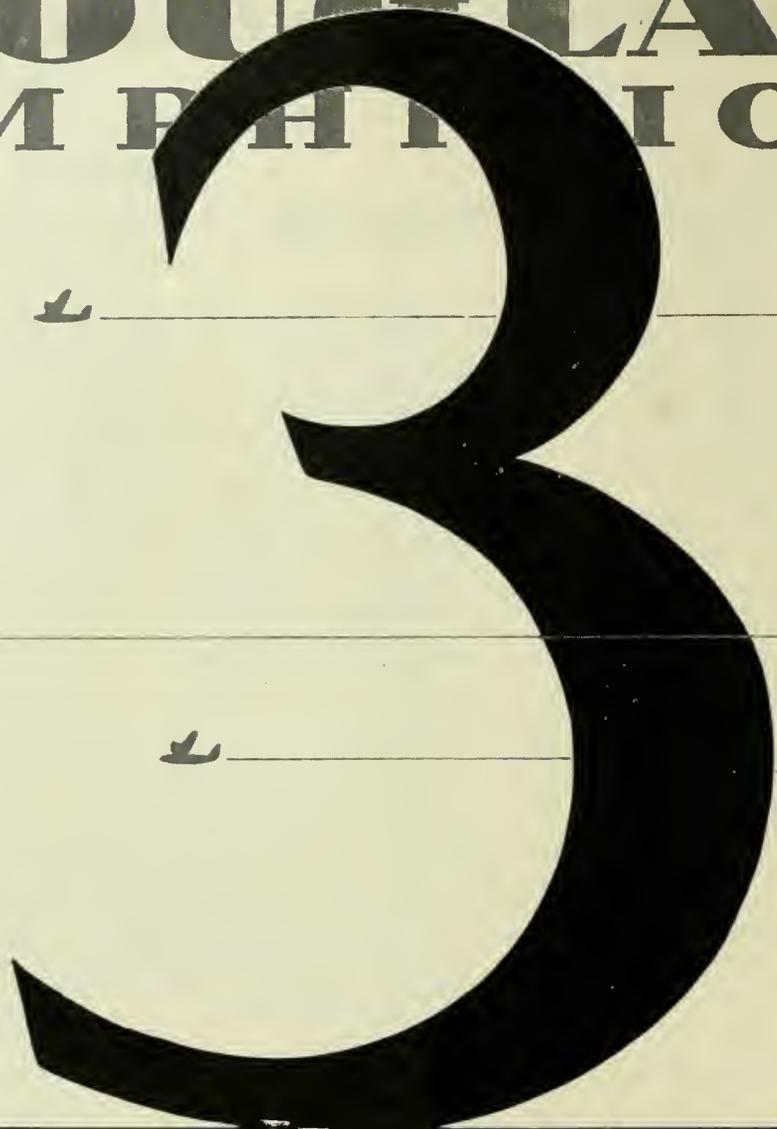
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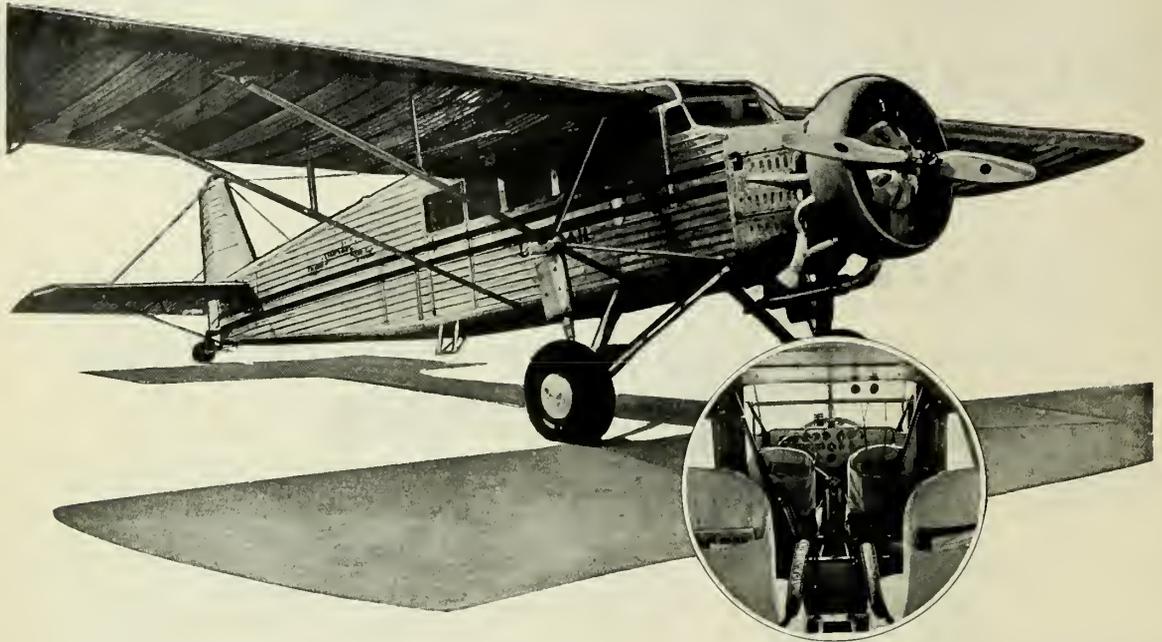


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AERO DIGEST

VOLUME TWENTY-THREE NUMBER ONE

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● The roar of powerful motors . . . the sight of a tight formation . . . never fail to thrill an Air Race audience

AIR • hot and otherwise

● We confidently believe that we are on the eve of seeing an "infant industry" become an industry. Whether this is achieved depends in the largest measure upon the conduct of those factors in the American aeronautical business whose motives we have had the soundest reasons for questioning in the past.

In the past—and also quite recently—we have had occasion to question whether or not the entire aeronautical fraternity of America was fully aware of the opportunity which was at hand to put, once and for all, the admittedly *unnatural* idea of human movement through the air upon the foundation of a completely recognized business. The most recent occasion for our raising this question was the promulgation of the Administration's Industrial Recovery Bill. AERO DIGEST, in first calling attention to this hidden opportunity, inquired politely whether we were not in danger of losing our chance of a lifetime through gross negligence in failing to create and maintain a sound and effective instrument for trade bargaining and group advancement—namely, the Aeronautical Chamber of Commerce.

Since we last hinted at this danger, there has been a complete change of heart in the Aeronautical Chamber, and a step has been made which might be termed as almost revolutionary. Thomas Morgan, president of the Aeronautical Chamber of Commerce, authorizes AERO DIGEST to make the following statement:

"When I was put in as President of the Aeronautical Chamber of Commerce, it was realized that where the future was concerned things looked very uncertain indeed. This caused a rather exhaustive study to be made and resulted in the realization that the Chamber would have to be reorganized, in order that it might effectively serve the interests of the whole industry. In addition to the normal problems confronting the industry, there recently was injected into the picture the Administration's Industrial Recovery Act and the legislation to carry out this measure.

"This new situation made it imperative that steps be taken immediately to have the Chamber so organized and its affairs so administered as not only to meet its normal functions, but to serve as an agency through which the Government could deal effectively as an entire industry. With this end in view, the Executive Committee has retained the services of Mr. Leighton Rogers, who has been commissioned to take in hand a study, for the Chamber, of all problems relating to reorganization which will be presented to the Board of Governors at

On the Eve



a special meeting, which has been called for June 30th. It is expected that complete plans will be ready at that time and that machinery will be set up which will enable us to meet any problems which may come up. In this connection it should be pointed out that all members of the Chamber, including the Board of Governors, are lending their whole-hearted support to make our efforts effective. However, in view of the problems ahead of us, and in view of the natural difficulties that usually exist in an organization of this kind, in order to achieve success it will be necessary to secure and maintain the enthusiastic co-operation of the whole industry, including those not now members of the Chamber."

It is, indeed, gratifying to see this quick response to a warning which we believe was given timely. However, we insist that the problem is not yet solved. We make this statement out of the conviction that many individuals in the industry do not yet realize the significance of the present situation.

Attitude of Many Must Be Changed

The aeronautical industry is not like many other older industries also confronted with government dictation under the terms of the Industrial Recovery Bill. Because of its youth, and its failure to achieve in all quarters full recognition as a new and unique industry, this measure of the New Deal contains an unexpected opportunity for aeronautics. But in order to realize upon that opportunity, the attitude of many individuals in the industry must be radically changed.

The fight is not yet won. It has taken an act of the Federal Government—a very radical act—to get us this far. Our industry can no longer be run by stuffing a ballot box full of proxies.

The time has come to realize that aeronautics in America for America cannot be run by two or three groups with influential lobbies in Washington. Full success can be achieved only by the industry working unselfishly for the good of the whole. At least the new government legislation has made that unavoidable.

FRANK A. TICHENOR

The old policy, which now fortunately is done with forever, tended to create the situation where our industry did a considerable amount of washing of its dirty linen in public. The Administration's Industrial Recovery Act now requires that we present a united front at all times.

As we reorganize our ranks for this new industrial idea, we welcome the presence of General Motors in the new alignment. We have reason to believe that this powerful automotive and general production group should be highly beneficial in the work which still has to be done.

Agreement on Procedure Essential

As this issue of AERO DIGEST goes to press, General Hugh S. Johnson, administrator of the recovery legislation, has sent out a call to all industries to submit fair competition codes and plans by which each industry may work as a unit. The administration of this new plan is at least wholly fair to this extent—it calls for suggestions from the industries as to how they should be aided and directed by the government.

But it will do no one individual in our field any good whatever to go pussy-footing down to Washington to knock on private doors and to seek inside secret conferences with wire-pullers. We have the Industrial Recovery Act to thank that that day is done.

On the eve of these significant changes in the line-up of our aeronautical endeavors, there is need for complete agreement upon a plan of procedure. This is absolutely essential to success. It is impossible to suggest here a program in full. But one thing can be done. In recognizing the opportunity we should select the largest frame possible for the requested code of competition. Business Administrator Johnson will want to know the specific aims and objectives of our industry as a whole. We must make it clear once and for all that we believe that all first-class mail should go by air, and that the air mail rate should be reduced immediately to five cents per ounce. We wish this fact stated clearly and in no uncertain terms. The time has come when other modes of transportation must be made to realize what we are seeking, and what we believe to be our rightful due. Those other modes of transportation also have their recovery problems. They cannot be eliminated. They must be made to fit into the new picture. They

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A Bingham in the Woodpile

C Y C A L D W E L L

● It is urged that the International Aeronautical Federation should investigate the National Aeronautic Association under Rule 186: "Any fraudulent proceeding or any act prejudicial to the interests of any competition or to the interests of aeronautical sport will be considered as infractions to the rules."

I charge that the N. A. A. itself has been guilty of acts "prejudicial to the interests of a competition and to the interests of aeronautical sport," which under Rule 186 of the F. A. I. is an infraction demanding thorough investigation. I presume that the N. A. A. is expected to abide by its own rules. Certain facts in my knowledge, while they are not conclusive without further evidence, yet are sufficiently damning to warrant a searching inquiry by the F. A. I.

In my possession I have many letters from two competing groups of air race promoters. The reason I have these letters is because I am on the advisory boards of both groups. I shall quote from the letters briefly.

In an open letter to pilots and others, dated April 27, M. M. Corpening, President, Chicago Air Race Corp., writes: "Application for the sanction of the National Aeronautic Association was forwarded to Washington, D. C., on Feb. 12th. Capt. Corpening and Maj. Schroeder appeared before the Contest Committee of the N. A. A. in person on Feb. 25th, prepared to pay a sanction fee equal to the fee demanded of the guarantors of the National Air Races. Capt. Corpening informed the Contest Committee that he was prepared to post total prize money equal to, or more than, any amount of prize money posted elsewhere for an air racing meet on the dates July 1-4. The application for a sanction was refused, and sanctions were given to the National Air Races, to be held in Los Angeles on July 1-4, and to an air racing meet to be held in Chicago on Sept. 1-4, the usual approximate dates of the National Air Races. The July dates were selected originally by the Chicago Air Race Corporation so as not to interfere in any way with the National Races, which for the past twelve years have always been held on or about Labor Day."

In a letter to me, dated April 18, Phil Henderson, Assistant Manager, National Air Races, Los Angeles, had written: "We started our preliminary work on this national racing circuit last fall, and requested the N. A. A., as early as last

November, to tentatively set aside the July and September dates, and gave them at that time a complete picture of what our plans were. . . . Although our announced stories did not appear for several weeks after the *Tribune* (the Chicago group) had announced their 4th of July show, arrangements were practically all completed early in January."

Leaving entirely out of this summary of evidence and opinions any discussion of the rights of either group to those dates, I come directly to the meat of the matter on which I base my charge that, under Rule 186, the N. A. A. has been guilty of an act "prejudicial to the interests of a competition and to the interests of aeronautical sport."

Here were two conflicting groups of air race promoters: the Corpening-Schroeder group in Chicago, and the Henderson Brothers group in Los Angeles on July 1-4, and also in Chicago on Sept. 1-4. It is obvious that the N. A. A. Contest Committee "in the interests of aeronautical sport" should act as an impartial judge between these conflicting air race promotions. "Impartial" is defined by Webster's dictionary as: "Not disposed to prefer or favor one above another; unbiased; unprejudiced; just; fair: as an impartial judge."

And was the Contest Committee an impartial judge? How could it have been impartial? Clifford W. Henderson, one of the competing race promoters, was a

member of the Contest Committee! In plain words, Clifford W. Henderson, race promoter and committee member, was placed in the peculiar position of being able to sanction his own air races and to condemn his competitor's races!

Promotor Also a Judge Bad Policy

Now, while the right to a sanction, or the penalty of a refusal of a sanction, to either of these two competing racing groups is a debatable question; and while the committee may or may not have been justified in refusing sanction to the Corpening-Schroeder group and in awarding it to the Henderson group, what the Contest Committee certainly was not justified in doing was to permit an air race promoter to function as a judge of his own air race promotion—and at a later date to function as a judge, by proxy, of his competitor's race promotion.

I can understand and I easily can forgive the faulty judgment of Hiram Bingham, President of the N. A. A., when he invited Clifford W. Henderson to act on the Contest Committee. At that time, no conflict between race promoters had occurred, and as Mr. Henderson knew a great deal about air racing, it is understandable that he should be asked to serve on the Contest Committee. But the very moment that a conflict impended, Mr. Henderson should have been requested to resign; at that moment the unmistakable danger signals were displayed. But they were ignored, for reasons unknown to me; and Clifford Henderson was permitted to remain on the Contest Committee. And right here I wish to state that I attach no blame to Mr. Henderson; I believe that he acted fairly and honorably, according to his honest convictions. On June 5th he advised me that he had resigned.

All N. A. A. rulings on air races promulgated since the 12th of February, 1933, should be investigated by the F. A. I., on the charge that they are "prejudicial to the interests of a competition and to the interests of aeronautical sport" under F. A. I. Rule 186. And in this I include especially the three-year penalty ruling for pilots who take part in unsanctioned meets. This vicious ruling was promulgated after the conflict of promoters' interests had been made plain, and very obviously was devised by Mr. Bingham as a club to force racing pilots to attend sanctioned races, for which exorbitant sanction fees could be extracted:

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World Wide photo
Air race official (with cap) donating sanction racket check to the President and Treasurer of the Natural Animosity Assn.

The Development of Military Aircraft From Racing Types

● AN authority on aeronautics many years ago asserted, "Tell me what nation holds the world's speed record for aircraft, and I'll tell you what nation leads the world in aviation." Subsequent sky history merely served to verify that bold prediction.

From the close of the late war until 1924 we were out in front, holding most of the air records of consequence, foremost among these being speed. During that time, although not having as many airplanes as some of the other nations (notably France and Great Britain) the United States was setting the pace in aircraft design and power plant development. We built planes which could show their tails to those produced abroad; which could carry heavier loads faster; which could reach higher altitudes—in short, superior air vehicles. The home of the Wrights led the world. Then the Government withdrew support, and we were forced to quit.

Next came the brief reign of France. France took the landplane speed record that marked her rise to supremacy. There followed quickly her altitude record, speed with weight records, and eventually her unquestioned title to air domination all along the line. But the French air ministry changed and economy, dissension and changes in policy wrecked their program.

England next appeared in the picture. Her sleek seaplanes, designed to bring back the Schneider Trophy, set new and unprecedented records for speed. This was the spark needed to change the slogan, "Brittania Rules the Waves," to "Brittania Rules the Air." But governments change. With them policies shift. So it was old England sank beneath the horizon.

But rejuvenated Italy came to the fore. The modern Napoleon, Mussolini, alternated between an ear to the ground and eyes to the sky. With his usual acumen, he realized that air supremacy meant military domination. He clearly visioned that air armadas made the cheapest defense. The tale of Italy's rise to the top is tied up with the lives and deaths of six men. Mussolini wanted to have the greatest air force in the world and as the first immediate goal, decided to capture the world's speed record.

General Balbo, his air chief, picked six of the leading pilots of the Italian Air Force to do the job. The most capable engineers were set to work to produce airplanes of speed and engines of power. Out of their efforts and struggles came new devices, new accessories, new improvements, all of which redounded to the benefit of Italy's flying mechanisms both of war and commerce. But, most important of all, the new enterprise gave

MAJOR GENERAL JAMES E. FECHET, U. S. ARMY (RET.)

birth to sleek, slim machines of unusual power, of unprecedented speed. On their trials hung Italy's immediate hopes for air conquest.

The pilots who were to be accorded the honor of guiding these winged bullets, of coaxing them to maximum speed, were Monti, Motta, Belloni, Neri, Dal Mollin and Agello.

The first of the ships was assigned to the proud Monti, eldest of the sextet. On its trial run over the three-kilometer course, something went wrong; the ship hit the lake and exploded.

With Monti went Italy's immediate hope for air speed laurels. But courageous men were left. Work was redoubled on the remaining planes. Controls were strengthened, brace wires were tested and the next of the four sisters was lowered into the bay. The engine was warmed up and Motta crawled in His fate duplicated Monti's. Belloni, Neri and Dal Mollin in turn struggled, but vainly. They ploughed into the lake at more than 400 miles per hour with succeeding speed chariots.

Italy would not be daunted; her air heads would not give up. One plane remained and Agello, the flying sergeant-major, also remained, eager and willing to win or ride it down. After a last effort by engineers and builders to find the elusive trouble, Agello taxied out, took off, turned and raced across the course. He was clocked at 426 miles per hour, a new world's record. England's flight officer Stainforth no longer held it. It had crossed the Alps in the seconds which saw Agello catapulted over the calm surface of Lake Constance.

Only recently Agello has pushed his record up to 440 miles per hour.

That is interesting in itself. But its real significance lies in the fact that it is a symbol. Speed in aircraft comes from two major things—excellence in airplane design and superiority in engine development. It took many thousand parts, many hundred accessories to make the racing plane the marvelous mechanism which it is. All of these have value. All of them will influence the design of commercial and military aircraft.

For many years the pursuit plane model of our air force in any given year was almost a duplicate of our racing airplane entry of the year before. The latter was built a little stronger in order to

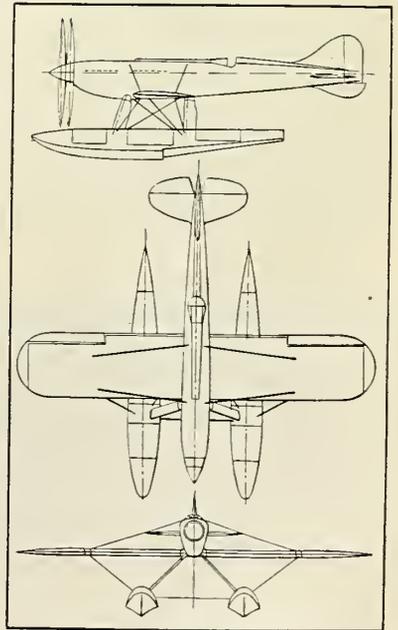
be able to withstand the fighting dives and combat maneuver strains. A little more wing spread was added to give it the needed performance at altitude. But essentially it was a direct development of the racing winner of the year before.

When the United States left the racing plane field pursuit plane development stopped short as though an order had been issued forbidding any further experimentation. As late as last year, eight years after our departure from the racing field, our pursuit planes were modeled after 1924's racer. The United States quit the racing field because the Army and Navy were not given the money for these experimental craft.

I was asked not long since, "When will the United States again take up airplane racing in an effort to win back the speed record?" I answered, "When the Army and Navy are again given funds to build racing planes. Not before." My inquisitor said, "Why is it that no sportsmen take up this hobby and build racing planes as they build racing yachts?"

The answer is not far to find. Because the sportsmen who can fly extremely

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Outlines of the Macchi-Castoldi 6-72

BEGINNING A NEW SERIES OF ARTICLES ON AIRCRAFT MARKETING

MISTER—

Can you spare a few thousand dollars for an airplane?

CHARLES J. CUTAJAR

● Talk about jig-saw puzzles! The daddy of them all is this picture entitled "The Aircraft Industry"—in ten thousand pieces.

The scene, so it is said, shows a landscape dotted with aircraft factories. The surrounding area is plastered with landing fields, bordered by sumptuous quarters for flying clubs, salesrooms, restaurants, lounges, beauty parlors, beer gardens, playrooms for the kiddies and for all we know, solariums for nudist sun bathers. The sky is of course filled with a swarm of planes, just flying around.

This jig-saw puzzle was given to the industry as a prize package a few years ago by an unknown donor. The recipients have never quite succeeded in putting it together. It is said that some of the pieces are missing.

The industry is rapidly losing interest in this puzzle picture. The novelty has worn off. It is concerned with the true picture of the aircraft industry, as it is today or may be tomorrow . . . what it is doing, where it is headed and what might be done to help it get there. This year of change is a mighty good time to take stock and find out "whether are we drifting?" or, more to the point, "why are we drifting?" An estimate of the situation calls for an understanding of what has happened to date. So let's go back to the starting point—the close of the World War.

War pilots became barnstormers

You can blame it all on the wartime pilots. The Armistice which could end a war could not thus abruptly end all desire to fly on the part of Uncle Sam's air warriors. If they could not continue to fly in a noble crusade, then they would fly for any cause or for no cause at all. And continue they did. From many a roadside field, cow pasture and hazardous waterfront they took to the air, to the edification of the crowds and at the everlasting risk of their own necks. Many of their ships were converted war planes, many unconverted and unregenerate. Every patched-up "crate" was eagerly commandeered for service.



Flying was just good fun back in the early days

Out of a rather high casualty list there arose an acute demand for better and safer airplanes for exhibition flights, for passenger hops and for the training of new recruits. Thus was created the first real market for commercial airplanes. A new industry was launched simply because youth wanted to fly. There is a lesson in that, of which more later.

Since those early days commercial aviation has presented a fourteen-year fantasy of adventuring that has no parallel in the romance of modern business. Future historians, attempting to record the kaleidoscopic panorama of aeronautical events, to chart the devious progress of the industry and grasp the import of its successes and defeats, will have difficulty in reducing the record to an orderly pattern. They will nevertheless discover one consistency in a maze of inconsistencies. It is this: Aviation responds in extreme fashion to every current trend. Events of such magnitude have taken place during its brief career that it could not help being, to a marked degree, a creature of circumstances. As a result the impress of the passing scene has been etched sharply on the impressionable mold of the young industry.

To illustrate. During the post-war gin-and-flapper days, in a world that considered itself disillusioned, reckless,

the picture that aviation presented was largely one of irresponsible pilots barnstorming the countryside. Air circuses drew crowds everywhere. Racing competition was developed and flying records were established almost weekly. Everyone wanted to "go up." Passengers at \$5 a hop were plentiful at any resort. Aircraft factories sprang up like mushrooms. The world was looking for novelty and excitement, and aviation did its best to satisfy the demand.

Then the scene shifted. Came Coolidge and Big Business. The merger mongers cast an eye on aviation and it looked good. An avalanche of money struck the industry and literally buried it under an imposing heap called Capital Structure on which equally imposing profits were to be made. Organizations were "set up" to do things in a Large Way at the very moment when the rumblings of a devastating economic depression could have been heard by a nation not so preoccupied with the pageantry of prosperity.

So it was, that at the very threshold of major expansion, amply provided with man power, money and equipment, ready to take its place as a ranking industry, aviation saw almost its entire market swept away by the ruthless engine of economic ruin. At that moment of its collapse, aviation cut the sorriest, the most tragic figure in the business debacle. Its excesses differed in no whit from those of older and wiser industries—the banking business, for instance—but in its case the result was devastating in the extreme. There were no earned surpluses of previous years to cushion the blow, no record of past accomplishments of real dimensions to assure investor and worker that the set-back was temporary and the come-back only a matter of time.

Markets vanished with cash surpluses

As private and corporate surpluses continued to recede and then vanish, so the market for private and commercial aircraft (airlines excepted) withered and died. Manufacturers' sales forces were disbanded. Plants were shut down. But a meagre dozen of the hardiest builders now remain to "mark the spot"

where an active industry had but three short years previously given employment to thousands.

During the period of retrenchment, the face-about to the rear, the industry has become addicted to the popular but wholly un-American formula of producing solely for the order in hand. Of the \$5,289,577 volume in aircraft (less motors) delivered during the first four months of 1933, about \$4,800,000 represents planes built virtually under contract for governments and transport lines. Thus a large section of the industry is engaged in what might be called custom work. It is not intent on broadening the market for its products by methodically searching out possible sources of prospects or by winning new converts to airplane ownership.

That being the situation at the moment and the industry having demonstrated its extreme susceptibility to every external influence, it is fortunate for aviation that *the world does not stand still*. Whereas in the past, adverse circumstances unexpected and sweeping have taken their toll, new forces now in the making, point to opportunities for an early and orderly revival of the market for commercial aircraft. The indications are that the industry is about to be persuaded, helped and even booted upstairs.

Let us first consider the help that may lead to quick relief. Its influence is already being felt. Its origin is traceable to the labyrinth of instrumentalities launched under the standards of the New Deal. Undeniably business has received a powerful stimulus from new thinking, new courage and definite measures already undertaken or promised (or threatened) for the relief of farm and home, of office, mill and factory.

Business revival big help to aviation

As this is written, the swing to higher prices, added employment and recovery of wage scales is marked and broad. Mr. and Mrs. Public are coming into the market for motor cars and for some of the other things that cannot be purchased at the A. & P. or at Woolworth's. Aircraft manufacturers should begin to get some inquiries. In some quarters this has actually happened. Miracle of miracles! A general business revival is the best "help" that could be given to the aircraft industry, especially at this time, when surplus stocks of serviceable used planes are at the lowest level in years.

Next to help, count persuasion. First in its ultimate benefit to the industry is the greater market for aircraft that will grow out of the unsatisfied longing to fly inherent in the first generation to achieve its majority in a flying age. No one in touch with the young people of today can doubt their intention to take to the air. This aspiration is universal among our young citizens whose hopes

of achievement have been deferred by the abnormal economic situation.

This unabated interest in flying is recorded in practical fashion by the enrollment figures in aviation schools. The Department of Commerce report of June 1, 1933, lists 7,366 active student permits. This year's total, then, while probably below the peak years of 1929, '30 and '31, should surpass the 1932 total of 8,038. In the universities, enrollments in aeronautical engineering courses remain practically undiminished, 6,978 students being enrolled for 1932-33 as compared with 5,116 for 1930-31 and 7,020 for 1931-32.

Youth wants to fly

Granting that a small body of men imbued with the flying urge fifteen years ago gave commercial aircraft manufacture its original impetus, is not the same urge today, multiplied many times over, fortified by the encouragement of an organized industry, destined to give rebirth to aviation? The challenge that sooner or later will have to be met is this: Thousands of young men and women would like to know *how* they may become owners of airplanes. How long will it be before the industry is persuaded that this waiting market is really worth doing something about?

A third factor among the influences which bear upon the recovery of the commercial aircraft market would have the effect referred to in a previous paragraph of "booting the industry upstairs." This might better be likened to an involuntary pruning to encourage a healthier growth. We refer to possible developments which would retard if not actually curtail the markets for military and transport planes.

From Geneva come persistent reports of a determination to limit aerial armaments and to prevent their export. If proposals already advanced were adopted, the effect would lead to an actual decrease in the military and naval air strength of the United States. This is by no means an issue to be courted. It is nevertheless very definitely a contingency that must be reckoned with in any consid-

eration of the aircraft market. Indeed, we need not look to Geneva for a possible check on the volume of war craft production. Our own Mr. Woodring feels that "new equipment is secondary to morale and general fitness" and that economies could be effected by the purchase of an airplane "now and then." Manufacturers for the government, who on the whole have been doing very well indeed, might well consider devoting at least a share of their excellent talents to the cause of developing and serving other markets. The effect upon the industry would be wholesome, even though the manufacturers concerned might regret the exigencies of the situation.

A second pruning threat is that concerned with the air mail. Washington would like to see the air mail self-supporting. Subsidies may be withdrawn. Imminent proposals might result in still higher postage rates for air mail and consequently less mail. Whether this might be followed by a reduction of routes and schedules could not be predicted. At the same time it is hard to see how the market for mail planes could thrive as a result. Another dent in the contract business may be foreshadowed.

A third pruning possibility, less imminent and definite, in fact one which enters the realm of the speculative, has to do with the much heralded rejuvenation of the railroads. The first "caterpillar train" is being built and is expected to perform at a speed of one hundred miles an hour. Does this mean one hour by rail from New York to Philadelphia in the future? Twelve hours to Chicago? Two days from coast to coast? On the long routes the airlines would meet this competition with still faster planes. But how about the shorter lines? New problems will certainly arise. If as a result those of our oldest and most capable manufacturers who seem chiefly concerned in producing transport planes to the order of airlines—in many cases through channels requiring no constructive sales endeavor—would see fit to explore additional markets for their prod-

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Boeing School of Aeronautics photo

They (and thousands like them) want to fly. What is being done to help them become owners of airplanes?

National Air Race Program

LOS ANGELES, CALIFORNIA, JULY FIRST TO FOURTH

• The National Air Race project, recognized as a most influential factor in accelerating the development of aviation, has become invaluable as an institution to aeronautics. Conceived and dedicated to the advancement of aviation, the ever increasing influence of these classics has attained world significance.

The 1933 National Air Race program has been designed to conform with the many constructive suggestions of participating pilots and prominent members of the industry interested in the success of competitive air racing.

The program has been shortened to four days and restricted to high-speed free-for-all competition in the several commercial competitive motor groups with \$50,000 cash prize money in addition to many coveted trophies.

International free-for-all competition is invited through the medium of the Vincent Bendix Trophy Race, transcontinental free-for-all; the Aerol Trophy Race, closed course free-for-all for women pilots; the Speed Dashes: Official World Record Attempts to establish three-kilometer straightaway speed in excess of 300 m.p.h.; and the Charles E. Thompson Trophy Race, closed course landplane classic, which has been increased to a distance of 200 miles.

The armed Military and Naval Air Forces of the United States will again participate with the latest military and naval air maneuvers.

Returning to Los Angeles after four years in Cleveland and Chicago, the 1933 National Air Races will present in four days all of the major speed and acrobatic events that in previous years have been distributed over a ten-day program.

Several hundred civilian and military airplanes including thirty or forty of the fastest landplanes in the world are expected to assemble at Los Angeles municipal airport during the period of the races.

Beginning with the inaugural ball at the Ambassador Hotel on the evening of June 30, air race week will abound in functions honoring world famous fliers, aviation executives and Army and Navy officers assembled there.

While twelve or more powerful racing planes are speeding across the country from New York in pursuit of the coveted Bendix trophy and \$10,000 in cash, floats and marchers from nearly every community in Southern California will be passing through downtown Los Angeles, participating in the inaugural parade which starts at nine o'clock the morning

of July first.

The daily programs of the races provide for a major racing event every hour from one to five p. m., while the intervening periods will be filled with spectacular features including formation flying by Army, Navy and Marine Corps squadrons, and acrobatic exhibitions by Maj. Ernst Udet, greatest living German ace, and Lieut. Tito Falconi, selected as the greatest acrobatic flyer in the Royal Aviation Corps of Italy.

The evening programs will include a fireworks extravaganza, an airplane diving at 300 miles an hour, a demonstration of an Army bombardment squadron bombing a village and an illuminated parachute jump.

So that the spectators on any one day may see all of the special racing planes in action that appear during the other three days, races are scheduled daily for planes powered with motors of 200, 375 and 550 cubic inch displacement, respectively. To stimulate competitive interest, sweepstakes awards are offered for those daily races and for the daily parachute spot landing contests.

In addition to the arrival of the Bendix transcontinental racers on July first, a special event on the afternoon program will be the world record Shell speed dash for women, in which the country's leading feminine pilots will attempt to shatter Mae Haizlip's world record of 255.5 miles an hour.

With the Bendix racers flashing across the finish line, women pilots speeding back and forth in front of the grandstand and the inaugural parade passing across the airport during the opening ceremonies, the program on opening day will probably be the most interesting of the entire four days.

A special attraction on July second will be the international Aerol trophy classic, a 100-mile women's free-for-all race around a ten-mile course. In this stirring event, the world's most experienced women pilots will compete for a \$3,000 purse and the Aerol trophy.

Spectators on July third are certain to see at least one sensational racing airplane chalk up a new world speed record in excess of 300 miles an hour, according to indications. With more powerful engines and more streamlined forms, several planes entered in the Shell speed dash for men are capable of exceeding the 294.38 miles an hour record established by "Jimmy" Doolittle in this event at the last national races.

As the grand climax on July fourth, a

dozen or so of the world's greatest pilots flying powerful racing planes will compete in the 200-mile Charles E. Thompson trophy classic around a ten-mile course. This is an annual international high-speed race.

Famous pilots who will appear in the various speed events include Mae Haizlip, holder of the world landplane speed record for women; Russell N. Boardman, transatlantic flyer and holder of the American air line distance records; J. R. Wedell, internationally known builder and pilot of special racing planes; Roscoe Turner, speed pilot; Art Chester, Ben O. Howard, Lee Gehlbach, Ray Moore, S. J. Wittman and other noted fliers.

SCHEDULE OF EVENTS AND PRIZES

SATURDAY, JULY 1

Bendix Trophy Race (Transcontinental Free-for-all)	\$10,000
200 cu. in. Free-for-all	\$ 400
375 cu. in. Free-for-all	800
Shell Speed Dash Unlimited cu. in.	1,500
550 cu. in. Free-for-all	2,000
Parachute Jumping Contest	200
550 cu. in. Shell Speed Dash—Men	1,000

SUNDAY, JULY 2

200 cu. in. Free-for-all	\$ 400
375 cu. in. Free-for-all	800
550 cu. in. Free-for-all	2,000
1,000 cu. in. Free-for-all	2,500
Aerol Trophy Race—Women Unlimited cu. in.	3,000
Parachute Jumping Contest	200

MONDAY, JULY 3

200 cu. in. Free-for-all	\$ 400
375 cu. in. Free-for-all	800
550 cu. in. Free-for-all	2,000
Shell Speed Dash—Men Unlimited cu. in.	2,500
1,000 cu. in. Free-for-all	2,500
Parachute Jumping Contest	200

TUESDAY, JULY 4

200 cu. in. Free-for-all Sweepstake Final	400
375 cu. in. Free-for-all Sweepstake Final	800
550 cu. in. Free-for-all Sweepstake Final	2,000
Thompson Trophy Race Unlimited cu. in.	7,500
Parachute Jumping Contest	200

SWEEPSTAKE AWARDS

200 cu. in. displacement or less	\$ 400
375 cu. in. displacement or less	800
550 cu. in. displacement or less	2,000
Parachute Jumping Contest	200



Fairchild Aerial Surveys photo

Preparations at Los Angeles Municipal Airport

• MORE THAN two months' work in special preparations at the Los Angeles (Calif.) Municipal Airport will have the field in readiness for the National Air Races by July 1. One of the municipal hangars, flanking the administration building, will be turned into a huge cafe, supplementing the regular restaurant facilities of the field. The other central hangar will become an exposition building. A third, with a floor space of 26,000 feet, will be reserved for the racing craft.

The airport was first made famous as Mines Field by the National Air Races of 1928. Immediately thereafter the City of Los Angeles took over the mile-square area where the show was held and commenced the development of one of the finest airports in the country.

The Los Angeles Municipal Airport is located twelve miles southwest of the business center of the city, within the city limits, and three miles from the shores of the Pacific Ocean. It is surrounded by open, level territory on all sides, and is ideally located for flying from the standpoint of meteorological conditions. It is easily accessible from all parts of the metropolitan area over three fine boulevards having numerous connecting links in the system of traffic arteries.

Improvement of highway approaches to the airport has been under way for more than a month, with city, county, state, and local suburban officials cooperating in this respect to make every possible access to the air race site available in the best of condition. It is expected that a record will be set in the handling of traffic, smoothly and with no congestion.

An A-T-E rating has been given the Los Angeles Municipal Airport, and it

A. E. CUTHBERT



has complete lighting equipment to secure the A-T-A rating.

The building group, including five large, fireproof hangars, the administration building, the restaurant building, the paint shop and several smaller structures, is of Spanish Mediterranean architecture and among the finest to be seen on any airport in the country. The field has complete meteorological equipment and receives weather reports hourly from three directions along airway routes. Some twenty-five firms are operating at the airport at the present time, giving aviation service of every type. The airport facilities are available, with attendants on duty, twenty-four hours daily.

Grandstands for the races, with a seating capacity for 30,000 people, will extend along the runway directly in front of the building group. An elaborate flood-lighting plan has been drawn up, an extensive public address system will be installed, and the telephone engineers have made their survey for teletype installation in the press box. Spectators will have full view of racing ships around the full distance of the closed courses, which lie over open fields adjoining the airport.

Six entrances will admit automobiles to the airport, through eight traffic lanes for each. Ample parking space, well lighted and properly guarded, will be conveniently located. Thorough fire protection will be given, with city firemen and extra apparatus stationed on the field. A special police system has been organized, a National Guard encampment will be pres-

ent, and the Red Cross has arranged for conducting an emergency hospital. A Boy Scout patrol will act as auxiliaries.

The Los Angeles headquarters of the Aeronautics Branch, Department of Commerce, has been moved to the Los Angeles Municipal Airport, occupying the second floor of the administration building. The Los Angeles City Department of Airports has its offices on the first and third floors. The Engineering Service of the Department of Commerce maintains its western headquarters in municipal hangar No. 5.

Army and Navy planes make much use of the Los Angeles Municipal Airport, ships representing one or both of the aerial defense services being on the line almost daily. It is expected that the March Field group of the Army Air Corps will make a summer encampment at the airport during July, with a fleet of ninety bombing and pursuit ships. Reserve unit planes are also frequent visitors at the field, using its all-way landing area to good advantage in practice and maneuvers.

Landings at the Los Angeles Municipal Airport approximate 5,000 per month, of which about twelve per cent are student training operations. Between seventy and 100 planes are stored in the airport hangars constantly. About 100 persons are employed on the airport, and another 100 work in the Northrop Corporation's factory which is across the street.

The executive head of the Los Angeles Municipal Airport is Colonel R. B. Barnitz, director of airports for the City of Los Angeles, who is also chairman of the Chamber of Commerce aviation committee.



Fairchild Aerial Surveys photo

Preparations at Chicago Municipal Airport

• Control has been worked out to a high degree for the American Air Races in Chicago, making possible the complete coordination of the race and exhibition program and the operation of commercial aircraft on the Chicago municipal field.

Air racing and allied exhibition work have become one of the greatest spectacles ever devised for public entertainment and public education on aviation. Along with them has developed an air transport system beyond the dreams of man a few years ago. These commercial craft must arrive and depart from their ports on a schedule that will brook no interference. Likewise, in order to hold an air meet, one of the primary essentials is an improved flying field served by efficient transportation. Invariably, such fields are those used by commercial craft, and of course, neither the air show nor commercial operations must be allowed to conflict.

Hence, the system of a central radio-telephone control tower was devised for the 1933 American Air Races in Chicago, by Maj. R. W. Schroeder, director of events. Only through one central control point can complete coordination be attained. In this tower are three men—a representative of the airlines, who is in constant touch by radio with the pilot of every incoming ship while it is still several miles from port; a representative of the Department of Commerce, who acts in a supervisory capacity, should any operating emergency arise that might call for some special decision, and Major Schroeder, who has complete supervision of the racing and exhibition program at the field. Without the authority of this control board, no airplane, whether it be

WINCHELL A. ROYCE

transport, racing or private ship may take off or land.

Should the transport planes be late or early in arriving, they will be notified that a race or exhibition is in progress and will not come into the immediate vicinity of the airport until granted authority by their field-control executive. In this way danger to transport planes and passengers is avoided and the safety of the exhibiting fliers promoted, together with that of the pilots of private ships.

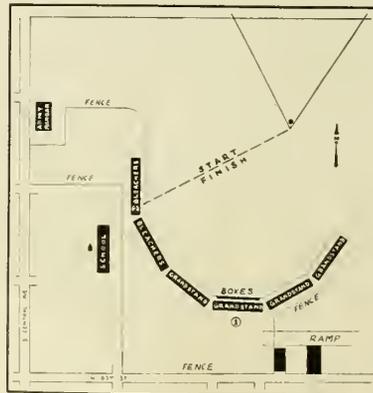
All transport pilots will be given written instructions from the Department of Commerce concerning activities around the field during the time of the air show. All planes not equipped with radio that are participating in the race program will

be put under the control of Major Schroeder in the control-tower, in constant touch with three field cars, all radio-equipped, which carry his orders to racing pilots.

Further to assure smooth functioning of the control system, two large visual signals have been installed for the period of the air meet. One of these signals is a large cloth panel, bearing the word "open" on one side and "closed" on the other. When the "open" side is up, the air race program is halted and commercial and private planes are permitted to take off and land. When the "closed" side is visible from the air, all flying except the air show program is halted. The other visual signal is a large red neon sign, which is kept burning while races, stunt flying and other exhibition features are in progress. No other airplane may take off or land while this sign is burning. Should a transport ship arrive during this period, it would be off schedule, because the air show program has been timed to coincide exactly with scheduled operations, and hence would be told by the airline dispatcher to stand off until the show event ended.

So efficient has this system proved to be at previous air meets under direction of Major Schroeder that it has been given the nation-wide approval of officials of all the large airlines, as well as that of city, state and federal aviation officials.

The airport itself is a 640-acre field located nine miles west of Lake Michigan and southwest of the Loop. Square in shape, it has a sod and cinder surface with four cinder runways. Service and storage facilities are available at the field.



Field layout, American Air Races

American Air Race Program

CHICAGO, ILLINOIS, JULY FIRST TO FOURTH

• A total of ten races for \$20,000 prize money—an average of \$2,000 per race—is offered at the American Air Races in Chicago. Ninety per cent of all racing pilots are eligible to compete in these ten events. Net profits of the races, which are to be held under the sponsorship of the *Chicago Tribune*, will be turned over to charity, it is reported.

The 1933 American Air Race program has several free-for-all races for cash purses. In addition to these events several A. T. C. races have been scheduled, in contrast to the Los Angeles races, where no special provision for A. T. C. plane races has been made.

The pilots now on the American Air Race Circuit of the American Air Race Association have appeared during May and June in air race meet exhibitions at Fort Worth, Texas; Oklahoma City, Oklahoma; Springfield, Missouri; Wichita, Kansas; Kansas City, Missouri; Omaha, Nebraska; Minneapolis, Minnesota; Duluth, Minnesota; and Chicago, Illinois.

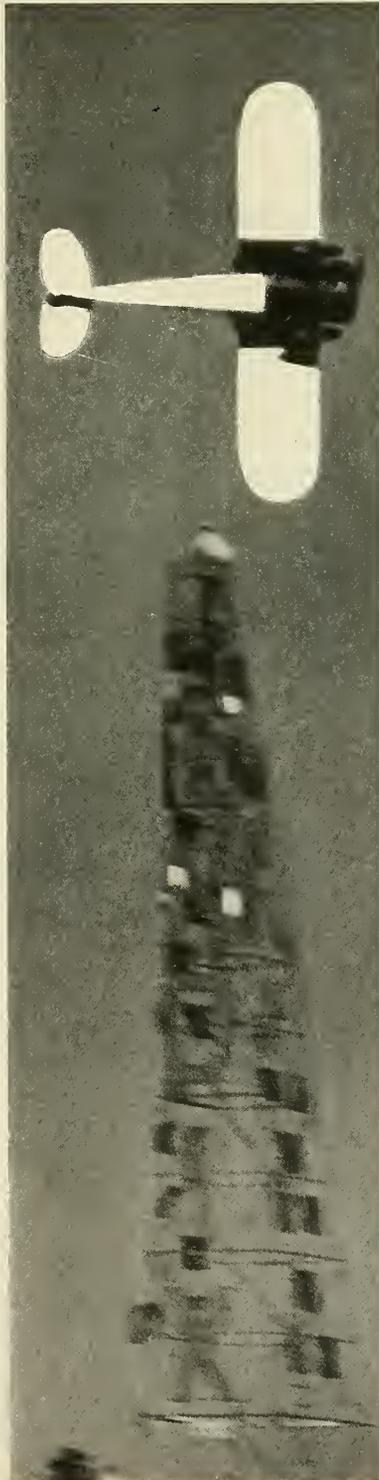
These pilots will have earned and won more than \$20,000 prior to the American Air Races at Chicago. A schedule of meets and events after the Chicago races should increase these earnings and awards on the Circuit alone by more than \$15,000. Including the Chicago and Circuit meets, pilots have earned and won during the 1933 season more than \$55,000 in American Air Race Association meets.

An elaborate program, designed to make the four-day meet one of the outstanding aviation events of the year, was mapped out by Maj. R. W. Schroeder, director of events. The meet is under management of the Chicago Air Race Corp., composed of the same group of aviation, civic and business leaders who conducted the 1930 air races in Chicago. M. M. Corpening is president of the corporation. John Hertz is vice president; Major Schroeder is secretary, and Charles F. Glore, treasurer.

More than 300 pilots, many of them speed or stunt fliers, are expected to participate in the races and attempts at new aircraft records.

Officials of the races predicted as they surveyed the entries that a speed record surpassing the present mark of 294.38 miles an hour for landplanes would be established during the meet.

Among the contestants for the speed championship will be John Livingston of Aurora, Ill., who is reported to have won more races than any other pilot. He has entered a plane which he says has made



280 miles an hour "without being exceeded."

A number of fliers who have made overseas flights will take part in the races, including Roger Q. Williams and Lewis A. Yancey, who flew to Rome in 1929; Bennett Griffin, companion of Jimmy Mattern on an attempt to circle the globe last year.

General Italo Balbo, head of the Italian air ministry, and his squadron of twenty-four Savoia-Marchetti seaplanes will be present, it is planned, following their flight across the North Atlantic from Rome.

Captain Walter Bremer, Finnish flier, plans to arrive at Chicago after his westward solo flight from Helsingfors, Finland. Captain Bremer, who flies a Junkers amphibion plane powered with an eighty-horsepower engine, hopes to arrive at the fair in time to participate in the Scandinavian Day celebration.

Arrangements have been made to handle a quarter-million spectators during the four days. The Century of Progress Exposition is drawing many persons to Chicago who are expected to include attendance at the races as one of the timely features of their visit. Furthermore, the municipal airport, where the races are to be held, is inside the city limits and is served by excellent transportation. Admission prices are reported to be the lowest in the history of any air meet of national importance.

The prize money was placed in escrow thirty days prior to the opening of the races.

Every person holding a Department of Commerce pilot's or mechanic's license of any grade will be admitted to the meet at any time without charge.

SCHEDULE OF EVENTS AND PRIZES

SATURDAY, JULY 1

350 cu. in. A. T. C. Ships.....	\$1,100
115 cu. in. Free-for-all.....	1,000
Parachute Jumping Contest....	200

SUNDAY, JULY 2

500 cu. in. Free-for-all.....	
Baby Ruth Trophy and.....	\$5,000
350 cu. in. Free-for-all.....	1,500
500 cu. in. Race, A. T. C. Ships..	1,100
Parachute Jumping Contest....	200

MONDAY, JULY 3

800 cu. in. A. T. C. Ships.....	\$1,200
115 cu. in. Free-for-all.....	500
Parachute Jumping Contest....	200

TUESDAY, JULY 4

500 cu. in. Free-for-all.....	
Aero Digest Trophy and.....	\$5,000
350 cu. in. Free-for-all.....	1,500
Unlimited cu. in. A. T. C. Ships..	1,300
Parachute Jumping Contest....	200

. EDITORIALS .

"If you take a look at the better commercial aircraft of today, you will find in them a reflection of the racing aircraft of yesterday. The racing craft of today are the forerunners of the better commercial craft of tomorrow."

—Z. D. GRANVILLE, Pres., Granville Aircraft Corp.

Announcement Of Expansion

• With this issue AERO DIGEST expands on two fronts.

We take pleasure in announcing the acquisition and merger with AERO DIGEST of "Aviation Engineering;" and also in announcing that AERO DIGEST has been designated by the American Legion as the official publication to record the activities of the American Legion Aeronautics Commission. A detailed statement of the purposes and aims of the commission will be found in this issue. We welcome this opportunity to be of assistance to the aviation men of the Legion. Every one interested in aeronautics, we are sure, will watch this new activity of the Legion with much interest.

Development and progress in times of stress and depression must largely be limited to the elimination of duplicated effort. Efficiency can be achieved by mergers. We feel that this worth-while objective has been achieved in the case of the acquisition of "Aviation Engineering," and we welcome its readers to the host of AERO DIGEST readers.

Our Share of \$1,300,000,000

• For several weeks prior to the closing of the Extraordinary Session of Congress, there was considerable doubt as to what share of government business would come to aeronautics through the \$1,300,000,000 public works appropriation. It seemed extremely doubtful for a time that our industry would get much, if any, of it.

The public works bill was so general in its provisions that it did not make any specific allocations of its more than a billion dollars in funds. Most of it, it had been understood, would go for general public works such as highway construction, flood control, rivers and harbors, public buildings and the Tennessee Valley project.

In the light of these fairly well authenticated reports we wrote last month cautioning the industry to balance its own budget.

We still think that this is good advice. But a rosier picture is presented to us today. On the eve of the adjournment of Congress, Secretary of the Navy Claude A. Swanson announced a \$238,000,000 building program of thirty-two new ships—four cruisers, twenty destroyers, four

submarines, two aircraft carriers and two gunboats.

We are pleased to note that following upon the announcement of this general plan, Rear Admiral Ernest King, successor to Admiral Moffett, immediately recommended the expenditure of \$15,000,000 for new fighting planes. A total of 290 planes will be necessary for adequate air equipment of the new ships. This is a good beginning. And all planes requested would be in addition to the five-year program of 1926.

There is a thing even more significant, however, for aeronautics in the new ship-building plans of the Navy. Effort is being made to have at least one of the new cruisers a flying-deck cruiser. Here, again, is our old unrealized victory of the London Naval Conference, thanks to the late Admiral Moffett. It is high time we began to do something about that paper victory.

The New Set-up

• It is too early to pass judgment upon the new set-up in the Democratic reorganization of the aeronautics activities of the Department of Commerce. It is too late to do anything with the age-old belief that to the victor belongs the spoils. We only wish to issue a note of warning. The organization developed under the direction of Colonel Clarence M. Young was highly efficient and extremely effective. Federal control of civil aeronautics is too important a thing to be made purely a political football. Let us have no born second-class postmasters in the reorganized Aeronautics Branch.

Nurse Maids for Tree Planters

• We personally saw a lot of grief all along the line when it was first announced that the New Deal, among other things, would include the attempt to make 250,000 tree surgeons out of 250,000 bench warmers. But we never got so far as imagining that this great Democratic Charity Drive would turn some of our Army aviators into Salvation Army Captains and Big Brothers to the submerged nine-tenths.

The situation would be amusing if it were not so deplorable. Conditions have become particularly bad at Mitchel Field on Long Island, which has been made

into a preliminary concentration camp for the New York division of the Conservation Corps. The time of most officers at this field has been cut into heavily by the special detail of "toughening up" the nation's new tree planters. It was a wholly unwelcome assignment made additionally disagreeable, particularly as to living conditions, because of laxity in selecting the types permitted to joint the corps. We trust that this is purely an "emergency measure," and that it will be a short one.

The Airship And the Future

• Another Senatorial investigation has been concluded, and with this marked difference from most—it ends in some good words of common sense, and upon a note with which we believe most persons will agree.

This latest of the Senate investigations undertook to discover whatever of lasting value to the national welfare there existed in the lesson of the tragic accident of the *U. S. S. Akron* and what the future Federal policy concerning this type of craft should be.

The Congressional command concerning this highly important experimental work is, "Forward."

A significant point in the recommendations of the Senate Committee is worth quoting:

"Rigid airships by past experience are found to have a special, actual utility on the scouting line of the fleet. There is a further potential utility to be developed only by experience. The rigid airships seem to have little utility in the operations of the Army. The allocation of airships to the Navy for development and operation is sound."

We congratulate the Senate Committee upon the sober and factual manner in which it conducted its inquiry. It did not fall into the error of sentimental hysteria over the tragedy which could never be recalled. In a measure we believe that the Senators were guided in this by the opinion of the press and the general public given immediately following the tragedy, which displayed no trace of hysteria, but the realistic appreciation that the airship idea was faltering hovering over an important crossroad. An admirable decision has been made as to the future course of the dirigible in America.

The Vanishing "Used Airplane"



E. L. ERICKSON
Aero Brokerage Service

● Down at my end of the airplane and accessory market, which is virtually the last point of turnover, I get a comprehensive perspective on the general condition of the industry. Evidences now show that airplane manufacturing is due for a sudden re-awakening to profitable activity. The used planes of the country that have not been washed out already are rendering their last services. There are only a few in the hands of brokers from the Atlantic to the Pacific, and no more are gravitating through to this ultimate market. The same holds true for practically every type of aeronautical accessory.

To complete a general survey of the used plane market throughout the United States I traveled up and down the Pacific coast, looking for planes with which to re-stock my hangar. I sought listings by mail, yet I have found nothing which adequately meets actual, present demands. Today I have a scant half dozen ships ready for delivery; a year ago I could have given a customer his pick of thirty; two years ago, fifty—and could have secured for him almost any item he requested, if I didn't happen to have it on hand. The demand is active and increasing and has been especially lively in the last sixty days. Before mid-summer, the aero brokerage business is going to have a real problem on its hands.

Of the used planes resold in the last two or three years, none will come back on the market; they are gone for good. Manufacturers can regard them as out of the picture, for wear and tear in service have put many of them out of commission. A considerable number delivered to the moving picture industry were washed out in "thrillers." Scores of them have been shipped out of the country to exploit the growing air-mindedness of the Latin Americas and the Orient. The comparatively small number remaining in good condition are in the hands of instructors and private fliers who are go-

ing to get as much service out of them as they safely can.

The old Liberty and Hisso jobs are, of course, virtually out of existence. The OX's are either washed out or not for sale. Standards, Internationals, Swallows, Eaglerocks, American Eagles, Lincoln-Pages, Wacos—ships in that category are simply unavailable. Fleets, Wacos, Great Lakes, or Birds cannot be picked up anywhere. Velie Monocoups are rarities. The larger cabin jobs are even more difficult to obtain—Bellancas, Lockheeds, Travel Airs, and Fairchilds aren't to be had. It takes a detective to find good engines to meet the current demand. I may locate one in Montana one day, and have a call for it in Arizona the next, and as frequently as otherwise I get the call before I find the engine. New OX's are scarcer than the proverbial egg-layer's bicuspid. There isn't a new Cirrus nor a good Velie that I can lay my hands on. And people must be hoarding their Wright J-6's along with their gold these days. Just what kind of aeronautical market situation does this all point to?

No Sign of Overstocked Condition

Nor does the supply for the used plane and parts market show much sign of loosening up. I have been checking a little on the factories and it is plain to me that the overstocked situation has been entirely liquidated. I doubt if there is a factory in the United States that could fill an order for five planes on the spot. Our factories in and around Los Angeles are turning out new planes steadily, but the government and transport lines are waiting for the big ones, and the little ones are finding takers at the doors ready to fly them away as soon as the paint dries.

There is no such thing as building up stocks, and there is no surplus which has commenced to flow on through the bro-

kerage markets. I feel that the manufacturers of the smaller planes are overlooking some bets right now, for the market is better than they appear to realize. For instance, a good 100 h.p. three-place job, reasonably priced, would find ready sale from any reputable factory today. Small cabin and folding-wing planes are not going begging. Moreover, the planes now in use are going to disappear rapidly within the year, with a consequent increasing replacement demand upon the stocks that should now be coming into existence.

Conditions with respect to the plane and engine market apply in like measure to the market in parts, accessories and equipment. Tubing, spruce, fabrics, dopes and varnishes—the shelves are almost empty. Used instruments are few and far between. Parachutes? I used to keep a dozen or so around all of the time and could easily get whatever was wanted, but I haven't a single chute in the place today.

There is a single exception to the state of affairs pictured here, and that is the transport plane market. The new fast jobs are forcing some of the older and bigger planes into the brokerage market and may create a temporary glut. But this will not be serious, for there are good prospects in the offing for the disposal of these craft. This is a normal, healthy situation, whereas by contrast the small plane market is nearly starved.

It looks as though the aviation industry turned the corner quite some time back, and hasn't found it out yet! When the factories appreciate that the country is ready to absorb a steady output, there is going to be an amazing pick-up, for the entire business of commercial aviation is given its pace from the manufacturing end. Conditions in the brokerage market clearly demonstrate that action from the producers is overdue. Saturation is dissolved, the surplus has been absorbed and now it's time to "take off."



Commercial airplanes of all kinds, built a few years ago, are rare today

AMERICAN LEGION AERONAUTICS COMMISSION

Movement to aid aviation

● The National Executive Committee of The American Legion has authorized the National Aeronautics Commission of the organization to use AERO DIGEST as an editorial medium for presenting official information on its activities each month. This action, which was taken at a meeting in Indianapolis, Ind., May 4-5 at the national headquarters of the Legion, is to bring to the attention of the aeronautical world this highly important and timely phase of the public-spirited work of The American Legion. Primarily AERO DIGEST was selected for this purpose because of the strong appeal the publication makes to people concerned with every branch of the field of aeronautics, as evidenced by the following letter from National Commander Louis R. Johnson to Frank A. Tichenor, publisher of AERO DIGEST:

"My dear Mr. Tichenor:

"Enclosed herewith find contract, signed, between the American Legion and Aeronautical Digest Publishing Corporation. I am pleased to be able to send you this contract, as I feel that the Aeronautics Commission of the American Legion can be of great assistance to the development of aviation in all its branches, and I know that the cooperation of AERO DIGEST will enable us to present the Aeronautics Commission's activities to the greatest number of aviation enthusiasts.

"The American Legion will be ready at all times to lend its support to the furthering of aeronautical activities in the interest of our government."

Every cooperative effort will be made by the Legion commission to enlist the support of other established agencies interested in the development of aviation,



in keeping with that fundamental policy of The American Legion which undertakes to assist or cooperate with proper organizations or groups of American citizens seeking to advance movements and programs of general public benefit.

The history of American Legion activities is replete with tasks that have been (and are now being) carried through to successful fulfillment. Enlisting the influence of The American Legion in the interests of aviation is one of the latest of these forward-looking movements. It is not claimed that aviation should be relied upon as the sole means of national defense, nor that this new means of transportation will bring immediately a complete restoration of prosperity. It is believed, however, that the potentialities of flying merit the active support of all public-spirited organizations in the United States.

The creation of the National Aeronautics Commission by national convention action of The American Legion automatically gave mandate for active participation under definite national direction to 10,745 posts in the fifty-eight departments (state and foreign organizations). In addition to the one million members of The American Legion itself, the Auxiliary, which includes wives, mothers and sisters of Legionnaires, as well as the neighbors and friends of the veterans, has now joined in a well planned national movement to further aeronautical development.

Why should The American Legion be so interested in aviation? As pointed out by National Commander Louis R. Johnson in his address at the aerial round-up banquet in Indianapolis on April 30th, the United States stands fourth in aviation for national defense among the powers of the world. From the standpoint of civil aeronautics, The American Legion believes this is one of the means at hand to bring greater prosperity to our country, and a better feeling and understanding among the people of the earth.

This Legion interest was manifest in the recent first national aerial round-up, in which Legion membership cards and dues were brought by about fifty planes from every state in the Union to national headquarters in Indianapolis within twenty-four hours from the most remote points in the country. Various Legion officials from distant states participated in the flights, which attracted the attention of all posts in the competitive race of the departments to lead in the number of membership cards delivered. Advance publicity regarding the round-up stimulated interest in both aviation and Legion membership. More than 50,000 of these membership cards were set down at national headquarters within the space of two hours, counted and reported to the banquet held that evening in honor of 250 visiting pilots, aviation and Legion officials.

AERO DIGEST believes that the effort of The American Legion in behalf of American flying can be judged best on its merits when its activities are consistently and regularly spread upon a record where all may read. It is for this



Commander Louis R. Johnson, Chairman E. V. Rickenbacker, Director H. Weir Cook

ORGANIZED FORCE PROMOTING AVIATION

joins a million Legionnaires

reason that AERO DIGEST cooperates with The American Legion in the program of its Aeronautics Commission.

The following is the summary program of the Legion Aeronautics Commission:

The objectives are the establishment and maintenance of a sound national policy with respect to military aeronautics, and the promotion of civil aeronautics as a necessary adjunct of the national defense, national development and community welfare.

The scope of activities includes:

Study of our national defense problems so as to be prepared to submit recommendations relative to the use of aeronautics in our scheme of national defense, in coordination with the work of the National Defense Committee. Assistance in development of civil air transportation. Publication of news material relative to aeronautics. Furthering establishment of Department aeronautics committees. National air "Round-up" as an aid to membership. Encouragement of the holding of model contests, air shows and Post aviation meetings. Marking cities, highways, etc., and cooperating with local agencies to that end.

Heading the Commission as Chairman is E. V. "Eddie" Rickenbacker of New York, American Ace of Aces in the World War and outstanding in the aeronautics industry of peacetime. Mr. Rickenbacker is too well known to the readers of AERO DIGEST to need a detailed biography. Suffice it to say that, after the war, with twenty-five enemy planes to his credit, he returned to civil pursuits and has had successful affiliations with the General Aviation Manufacturing Corporation as Vice President and Director of Sales, more recently with the Aviation Corporation as Vice President of American Airways, Inc. Besides his aviation activities, Mr. Rickenbacker as President of the Indianapolis Motor Speedway has been the moving spirit back of this world-renowned speed classic for several years.



Vice Chairman of the Commission is Norman M. Lyon of Los Angeles, with a record of experience in lighter-than-air flying. He is past commander of Aviators' Post 350 of the Legion in Los Angeles and was Chairman of the California Legion Department of Aeronautics Committee, 1931-32. In the World War he acted as navigator in the flying boat patrol work from Hampton Roads to the North Carolina capes.

John Dwight Sullivan of New York is an attorney who is experienced with aviation subjects, a combination of particular value to the Commission. He was commander of the New York County American Legion, 1932-33, and has been Chairman of the New York Legion Department Aviation Committee since 1931. As Commander of Aviators' Post 743, he organized the first New York aviation show held under the auspices of his post in New York City in February, 1929.

T. B. Clement, Vice President of Transcontinental & Western Air, "The Lindbergh Line," is a Pennsylvania Legionnaire, has offices in New York and Kansas City, and resides in Great Neck, Long Island. He served in the World War as a captain and was commissioned in the field. Mr. Clement is one of the pioneers of the transportation industry. He was Passenger Manager of the International Mercantile Marine, until aviation made its bid for recognition, when he joined the new forces and was appointed General Traffic Manager of Transcontinental Air Transport.

J. Carroll Cone, of Little Rock, Ark., is in command of the Arkansas National Guard Air Squadron and is State Director of Aeronautics, holding the rank of major in the Arkansas National Guard. Last month he was appointed director of aeronautical development of the Department of Commerce. In the World War he went from the Air Service section of the Signal Corps to flying instructor at Issoudun, France, then to pursuit pilot, being promoted to Captain. After the War he continued flying activities and engaged in airplane manufacture in Little Rock and Kansas City in 1929-30.

Rudolph W. "Shorty" Schroeder, of Glenview, Ill., was formerly President of the Sky Harbor Airport, Northbrook, Ill., near Chicago, which office he had held since he was a pioneer flier and airport executive. He was educated in the Crane School of Technology. In the war he served in the Aviation Section, Signal Corps, and for several years was chief test pilot at the Army experimental station, McCook Field, Dayton, Ohio. It was while chief test pilot that he developed, with Captain Patterson, performance test methods which still are in use. It was also during this service that he fostered the further development and adoption of the free-type parachute pack as conceived and developed by personnel of the Army Air Corps experimental staff, and he was the first air service officer to wear one.

The Director of the Aeronautics Commission, H. Weir Cook of Indianapolis, Ind., served in the Rickenbacker squadron in the World War and is officially credited with the destruction of several enemy aircraft. In 1920 he flew the air mail between Chicago and Omaha, and then between Omaha and Salt Lake City. He later served several years as a captain of Air Corps in the regular army, much of this time as instructor in combat aviation subjects at the Air Corps Tactical School, Langley Field, Va.



J. Carroll Cone Norman M. Lyon

**AERONAUTICS
COMMISSION**

●

E. V. RICKENBACKER
Chairman

NORMAN M. LYON
Vice Chairman

H. WEIR COOK
Director

JOHN DWIGHT SULLIVAN
J. CARROLL CONE
R. W. SCHROEDER
T. B. CLEMENT



R. W. Schroeder John Dwight Sullivan



Personalities

• IN PRESENTING that good sportsman, Bill Ong, who fought a rearguard action during the course of the 1932 Thompson Trophy race, and who would have come in first if all the other contestants had dropped out, it occurred to me to set down here a comparison of the speeds made in the last three years' Thompson events. It just goes to show the amazing developments that have been accomplished in aviation despite the handicap of strained national finances and what is laughingly referred to as the depression. If what we've been through, and still are in, is called a depression, I'd be curious to see what a real dent or hole in the financial structure would look like. Compared to it, the Grand Canyon would resemble a valley on top of a hill.

Thompson Trophy Races

	1930	1931	1932
1st place, av. speed.	201.91	236.23	252.68
2d place, av. speed.	199.80	227.99	242.49
3d place, av. speed.	162.80	211.18	233.04

The plane that finished in *third* place in 1932 would have beaten with 31 m.p.h. more speed the one that won *first* place in 1930. In fact, if that 1930 winner had competed in 1932, it would have ended in seventh place, with six others, from 15 to 51 m.p.h. faster, ahead of it. Only Bill Ong would have trailed it, in Benny Howard's *Ike*, with 191 m.p.h., and Bill was simply in the race for fun, anyhow, in a tiny Menasco-motored ship of 160 h.p., competing with big Wasp-powered racers of from 535 to 770 h.p. So you see it wasn't Bill's fault that he was end man. When a good little ship with a good little engine races a good big ship with a good big engine, the outcome is never in doubt, no matter how good a pilot may be. Bill's trouble was that he couldn't fly faster than the ship would let him.

Bill started racing in 1927 with an OX-5 Lincoln-Page and by 1932 had advanced or gone backward with Benny Howard's *Ike*, according to how you look at it. Each year Bill went faster than the year before; but each year he met faster and faster ships, and won less and less money. He said to me, "The faster I fly, the slower I go financially, because I won more money with an OX-5 than I won with *Ike*." This year he'll probably fly still faster and win even less, which seems to be his system. But he

by Caldwell

can't possibly win less than he won in the Thompson in 1932, because there he got nothing. However, he came in second in the 685 cu. in. race and just nosed into the money in fifth place in the Phillips Trophy race in 1932. He won the staggering total of \$375 in those two races, and won my sympathy in the Thompson. As president of the William A. Ong & Co. Aviation Enterprises, Kansas City, Bill doesn't need to win any money at races, because he has several loyal souls all working hard for him and supporting him in a style to which he has become accustomed.

He was born in Lacon, Ill., Dec. 28, 1902, and is now 30, an ideal age. At 30 one has outlived the foolishness of youth and has not yet reached the decrepitude that comes stealing over one after 40. At 30 you are keen to insert yourself in an airplane that fits you like a tight shoe and go hurtling over the landscape at three or four miles a minute, for any reward from \$125 on down to absolutely nothing. It is, I repeat, a happy age, and it's a shame that all of us can't be 30 forever. Even Bill Ong can't stick it after this year.

His life, until 1927, is a mystery to me, and even after that it is none too clear. The details are hazy. They are hazy even to Bill, who claims that in 1927 he suffered a temporary mental lapse, fell into a period of coma, and awakened to find himself enrolled as a student in a Kansas City flying school. After a hazy

period of instruction, he found himself alone in the air, except for an OX-5 Eaglerock, which was rather doubtful company. There was nothing to do but fly the thing down, so Bill did that, learned to fly, lapsed into another coma, and awakened to find himself in an office marked "Vice President." He had his feet on a walnut desk and wasn't doing a thing, so there was no doubt that he really was a Vice President. The company turned out to be the Beacon Airways of America, and Bill's duties were purely nominal; he signed stock certificates, signed orders for great numbers of airplanes that he hoped to sell, and didn't, and otherwise disported himself after the immemorial custom of vice presidents, from Casey Jones on down to John Nance Garner.

Becomes a "Rear Winner"

After Beacon Airways had flown on into the Great Beyond where many companies go, Bill Ong became sales manager for Rearwin Airplanes, Inc., which was somewhat prophetic, as Bill flies most of his races in the rear, only he doesn't win. In an effort to boost sales for Rearwin, Bill moved over and became sales manager for Inland Aviation Co. Eighteen months later Inland folded its tent like an Arab and silently departed to that Valhalla where defunct airplane factories foregather, wailing and gnashing their lathes. This so discouraged Bill that he gave up all hope of further salaries and founded a company of his own; it will probably keep on going if he resolutely refuses to be his own Vice President and sales manager. On those other companies he seems to have had the happy effect of an enthusiastic corn-borer on an ear of standing corn.

"I will race at Los Angeles this year," he writes me, "if someone is silly enough to loan me an airplane; otherwise not, and by an airplane I mean something that will go places. I hope to be able to fly respectably around a race course and not be forced to taxi from pylon to pylon, as I did last year in order to keep out of the way of the hot shots buzzing past my ears. Perhaps, though, I am too ungrateful, and should appreciate the privilege of being able to stand near the beautiful Roscoe Turner as he poses for his public in his lovely Betsy Ross Corps uniform." (Continued on following page)



Bill Ong

Still MORE speed

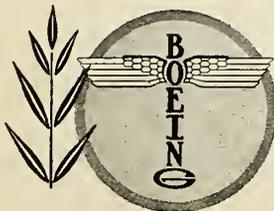
FOR THE Boeing 247!



This plane is on display in the dome of the Transportation Building, Century of Progress Exposition, Chicago.



Even higher performance for the Boeing 247 has been accomplished with the use of Hamilton Standard controllable pitch propellers, but without increase in the rated horsepower! The cruising speed has been stepped up from 165 m.p.h. to 171 m.p.h.! At the same time, improved takeoff, rate of climb and single-engined performance have been obtained. And the plane not only will maintain level flight but also will climb, fully loaded, on either one of its two Wasp motors. . . . Approximately 40 of these "three-mile-a-minute" transports are already in the service of United Air Lines, cutting Coast-to-Coast air travel time to 20 hours, and making similar reductions on United's other routes. Combining high performance with outstanding strength, payload, passenger comfort and operating economy, the Boeing 247 is truly "tomorrow's transport today"! Write for detailed specifications. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



BOEING *has always built
tomorrow's airplanes today!*

(Continued from preceding page)

● MAJ. ALEXANDER P. DE SEVERSKY, U. S. Air Corps, Specialist Reserve, was born in Tiflis, Georgia, Russia, June 7, 1894. Contrary to the prevailing American belief that all Russians are born equipped with a full set of bushy, black whiskers, Alex was born clean-shaven; he wasn't even carrying a bomb at the time, which I understand all modern Russian babies must have, by special orders of the OGPU—or Gay-Pay-Ooo, as we old Russians pronounce it. In 1894 Russia was a very quiet and pleasant place, for at that time the Czarist government hadn't been undermined by Rasputin, Trotzky, Lenin or even John, Ethel, and Lionel Barrymore; so Sasha, as he was called, because his name was Alexander, grew up in the pre-war or early Hollywood period Russia, eating caviar and drinking vodka and riding around in droshkies and thus preparing himself to become a dancer or a Volga boatman, the two outstanding Russian professions—or else the movies have deceived me.

Much to the surprise of other young Russians, who were dancing and Volga boating and thus training for useful careers under the old regime, Alex went to the Imperial Naval Academy of Russia and graduated as a lieutenant in the Imperial Russian Navy. That is, he graduated into what the Japs had left of it after Port Arthur and Vladivostok; I believe they had one battleship and a boat that used to be a Staten Island ferry. The armored cruiser *Potemkin* already had been made into a movie. It was no wonder that Sasha took a Naval post-graduate course in aeronautics and became a mechanical and aeronautical engineer—which is not to be confused with the term "mechanical aeronautical engineer," which means an engineer who mechanically follows another engineer's design and puts his own name on it.

Joins the Bombing Squadron

In 1915 Lieutenant de Seversky joined the Russian Naval Air Service, and became a member of the Second Bombing Squadron, Baltic Sea Naval Air Service. On July 2 of that year, during a night bombing expedition in the Gulf of Riga, he attacked a German destroyer and saw two of his bombs score perfect hits. In the inspired words of my gifted friend Samuel Taylor Moore, who under the influence of proper stimulation can write very flossy English: "The destroyer's fire made the air a roaring, crimson inferno as de Seversky banked to dive again. Then, suddenly, his plane heaved drunk only—" (I love that "heaved drunkenly," don't you?) "it heaved drunkenly in the concussion of a bursting shell and darted down through the night . . . into the sea. Plunged deep into the cold waters of the Baltic, de Seversky struggled up to the



Sasha Seversky

surface. Gasping and choking, he reached it, and in the weird glare of the northern lights saw the wreckage of his plane floating about. With his first breath he shouted the name of his bomber. There was no answer. He felt for his paining leg. It was off at the knee!"

Leaving the drunkenly heaving Sam Moore I shall record in my simple, child-like English that de Seversky was rescued by a Russian destroyer, his wound dressed, and himself deposited in a hospital to recover and be invalided from the war. Any normal human being would have been willing to call it a day after donating a leg to his country; I know that the loss of one toe would have been sufficient to send me scuttling back to civil life, simply boiling with chagrin and righteous indignation. But from his cot in the Kronstadt Hospital Lieutenant de Seversky went back to the war, rose to the rank of commander, became an ace with every decoration the Russian Government could give him, and won further honors for several inventions.

After leaving the hospital he was appointed General Naval Inspector and Officer in Charge of Aircraft Production in the Petrograd district. In the spring of 1916, by special permission of Emperor Nicholas II, Commander de Seversky was permitted to return to the Front and assume command of a bombardment squadron in the Baltic Sea. He designed a special universal landing gear for seaplanes and flying boats which enabled the Naval Aviation of the Baltic to function all the year round, in spite of frozen waters. He also invented a bomb sight and devised a method for hunting submarines by the use of the airplane.

Shoots Down Thirteen Planes

In 1917 he was appointed Chief of Whole Pursuit Aviation of Baltic Sea. His force was constantly engaged in fighting; many German planes were brought down. He, personally, is credited with thirteen enemy planes. He was awarded the following decorations: Knight of the Order of St. George, the highest military award in Russia; he was presented with a gold sword by the late

Emperor II of Russia for his bombing expeditions and other activities; and he was awarded the decorations of St. Ann, 2d Degree; St. Stanislaw, 2d Degree; St. Vladimir, 4th Degree; St. Ann and St. Stanislaw, 3d Degree. Like all governments, the old Russian one paid the heroes in medals and the munition manufacturers in cash.

Commander de Seversky, in December, 1917, was appointed Vice Chairman of the Russian Naval Aviation Commission to the United States. Russia's tragic year of 1917 had opened with the assassination of Rasputin, who had been on several people's lists as a gent who would never be missed; by spring the Czar had been dethroned, and the Kerensky provisional government was giving satisfaction to nobody—not even Kerensky, the Hoover of his day. Commander de Seversky was lucky in his appointment to the United States, for as a former officer of the Czar he'd have probably got in the whiskers of Mr. Trotzky, who had left his pants-pressing business in the Bronx, New York, to bring a new Bronx culture to the stolid Russian moujik, who even to this day is a bit dubious about the Bronx—and no wonder. The Russians are lucky that they got Trotzky instead of Commissioner Flynn, from the part of New York called the Bronx.

His Work in the U. S.

De Seversky arrived in the States to learn that the Russian Aviation Mission, with the fall of the Russian Government, had dissolved and opened a Russian restaurant, the Samovar, where tea and lemon, caviar and balalaika orchestras were to be had; *couvert* charge one dollar. One of the Aviation Mission now stood outside in full regalia, chanting, "The Samovar, up one flightsky." Instead of seizing a balalaika and strumming a Cossack dance, Seversky offered his services to the United States and was employed as aeronautical engineer and test pilot for the Government and then appointed inspector of so-called battle planes for the Buffalo district. Any plane that didn't kill a test pilot was accepted, paid for, sent over to France, stored until the Armistice, and then burned, which should have been done in the United States in the first place, to save cartage.

In 1921 Seversky was appointed consulting engineer for the U. S. Army Air Service. He developed a bomb sight apparatus which served as the basis for the development of the modern bombing control devices. This invention proved so successful that the Government purchased the rights to it. Of course, meanwhile Seversky had taken out his first papers in this amazing country of ours, and on Nov. 26, 1927, became an American citizen.

(Continued on page 72)



Hamilton Standard Controllables Throughout the World

It is significant that nine of the world's leading air lines are already using or have placed orders for Hamilton Standard Controllable Pitch Propellers. This rugged, hydraulically operated controllable enables aircraft operators to take full advantage of modern improvements in engine and plane design.

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AND TRANSPORT CORPORATION

PRIVATE FLYING

National Air Treasure Hunt Announced

SPORTSMEN PILOTS will meet at Saint Louis, Mo., in their airplanes from all sections of the United States, this autumn, to take part in America's first nation-wide Air-Treasure Hunt, according to the U. S. Amateur Air Pilots Association. The hunt, which will be held in connection with the National Charity Air Pageant at Roosevelt Field, N. Y., on October 7 and 8, will leave St. Louis October 3 and arrive in New York, N. Y., October 7.

Bernarr Macfadden, sponsor of the air cruise, has donated a silver punch bowl trophy for the winner of the contest, besides \$2,000 in cash prizes. All contestants will be furnished, without cost, gasoline and oil for their planes and hotel accommodations for the four days consumed by the event.

In the aerial treasure hunt the pilots will line up at each control city airport and will be given a starting time based on the cruising speed of their respective airplanes. As they are given the signal to start, each will be handed the complete "clue" for the first leg, the clues, with one line missing, having been previously published in *Liberty* magazine. The cryptogram, when deciphered, will give the pilot the direction and number of miles he is to fly before searching for one of seven large cloth letters to be placed in open fields. Observers will be stationed at each letter to check the number of the airplanes in the order in which they discover the letter, points being awarded to the first twenty contestants to fly over it. After discovering to which of the seven letters the clue directed them, the contestants will refer to a card previously given them, and will find opposite the letter, the name of the airport at which they are to land and receive the next clue. After all seven letters have been located, the contestants will attempt by their knowledge of aerial navigation to place on their maps the location of the letters. Points will be awarded for the degree of accuracy in designating the correct geographical location.

Long Island Group Plans Cruise

THE LONG ISLAND Aviation Country Club of Hicksville, N. Y., has announced plans for its third annual invitation seaplane cruise, to take off from Long Island July 13, proceeding to the Seignior Club of Lucerne, Ontario, Canada, where a fishing party will be formed. On the afternoon of July 15 it is intended to leave for Westport, N. Y., where members of the cruise will be guests of John T. de Blois Wack. A dinner and dance will be held at the Westport Yacht Club, and a golf tournament the following day and a dance will be followed by a take-off for Long Island

on the morning of the 17th. The size of the cruise will be limited to forty people, no plane carrying more than four persons.

Michigan Holds Week-End Air Trips

A SERIES of week-end tours by private planes are being planned this summer under the auspices of the Michigan Air Tour Association and the Aviation Committee of The American Legion. Milo Oliphant of the Ypsilanti Airport is chairman of the week-end tour committee.

Ninety-Nines Have Skating Party

A BENEFIT entertainment, including roller skating and dancing, was held June 16 by the Ninety-Nines in Hangar 20, Roosevelt Field, L. I., N. Y. Mrs. Betty Huyler Gillies was chairman.

Pylon Club to Cruise to Canada

THE SECOND annual cruise of the Pylon Club, Patco Field, Philadelphia, Pa., to the Thousand Islands, Ontario, Canada, is scheduled to begin July 1. Members will be guests of Philip T. Sharples, another member of the club.

Kansas City Group Plans Flights

GROUP AIRPLANE VISITS from Kansas City, Mo., to other communities throughout the Middle West will be conducted on a program basis, under the plans developed by the Propeller Club. This association of private plane owners and pilots was organized recently with Dr. John D. Brock as president. Airplane fleets of five to fifteen, or more, will be scheduled for trips to cities within one day's round-trip flying time.

The charter membership of the Propeller Club is twenty. All owners of private aircraft, or pilots flying for such owners, are eligible.

California Flier Wins Women's Race

MISS HENRIETTA SUMNER of Los Angeles, Calif., flying a Travel Air, won the second annual Annette Gipson air race for women June 4. The race, which had been postponed from May 30, was held over a forty-five-mile course to Valley Stream, L. I., N. Y., from Floyd Bennett Airport, Brooklyn, N. Y. Miss Sumner's time was 17 minutes, 9 seconds, plus a handicap allowance of 3 minutes, 39 seconds.

Mrs. Frances Marsalis, in a Waco, was second; Miss Jessamine Goddard, in a Monocoupe, was third, and Mrs. Mary Moore Sansom, piloting a Fleet, was fourth. Mrs. Amelia Earhart Putnam was the starter, and Miss Ruth Nichols, chief scorer. Mrs. I. J. Fox was chairman of the contest committee.

Long Island Aerial Treasure Hunt

FIVE Long Island, N. Y., airports were the scene of an airplane treasure hunt by twelve pilots June 18. The fields visited in the course of the hunt were Roosevelt Field No. 1 and Roosevelt Field No. 2 at Mineola, Fairchild Field at Farmingdale, Suffolk Airport at Riverhead and Curtiss Field at Valley Stream.

Bill Zelcer, piloting a Loening Commuter amphibion, was the winner of the hunt, and Swanee Taylor, with a Waco cabin ship, finished second. Two students of Roosevelt Aviation School, David Wehman and Norman Whiteside, were third and fourth, respectively, flying Fleet training planes.

Official of Ninety-Nines Re-elected

AT A RECENT MEETING in Norristown, Pa., Dorothea Leh, governor of the middle eastern district of the Ninety-Nines, was re-elected to the office. Fifteen women pilots attended the meeting.

Alton Club Membership Exceeds 100

THE ALTON Aeronautical Club., Inc., of Alton, Ill., which was organized in 1925 with a membership of about ten, now has over 100 members, both local and national. Membership is open only to those connected directly with aeronautics, such as engineers, instructors, students, etc. The organization is not only a flying club, but also an organization for the research and promotion of aeronautical engineering and its allied sciences. The club maintains a library of technical books on aeronautical subjects, numbering over 2,000 volumes, which are lent to members and responsible persons in the vicinity.

Golf Enthusiasts to Fly to Maryland

AIRPLANES for sports activities will replace automobiles for traveling by more than fifty sportsmen, sportswomen and golfers of Philadelphia, Pa., when they journey to Easton, Md., to participate in their favorite sports pastime at the Easton Country Club, this summer, according to a report received by the management of the club from Jack Barlow, vice president and general manager of the Wings Corp. of Philadelphia. Mr. Barlow stated that the sports followers will make the journeys to and from Easton and Philadelphia in twenty to twenty-five airplanes and autogiros. The Easton, Md., airport will be placed at the disposal of the Philadelphia sports devotees.

A similar use of airplanes by a group of Philadelphia sports followers was made last year, when they journeyed to Salisbury, Md., and played on the Salisbury Country Club grounds. The planes were chartered from the Wings Corp.

A STEP FORWARD IN AIRCRAFT CONSTRUCTION



NATIONAL



STAINLESS AND HEAT RESISTING AIRCRAFT TUBING



U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York, and Fried. Krupp A. G. of Germany.

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Also for instrument-board members, control rods, and the like, this seamless chromium-nickel alloy tubing is without equal, having not only superior strength and durability, but with them, lasting beauty.

NATIONAL U S S 18-8 Stainless Aircraft Tubing is made of highest quality electric-furnace steel and conforms fully to U. S. Army and U. S. Navy specifications. Users may rely on it as embodying all that science and skill can contribute for the needs of aviation. NATIONAL engineers and metallurgists will gladly lend their aid in determining the best application of this material to particular requirements. Literature on request.

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• AT THE AIRPORTS •

Airport Construction Progress Cited

WITH over half of the recommended quota of forty-six major airports for the New York area already provided, the Regional Plan Association for the district last month reported progress in the improvement and building of airports. Four years ago the organization recommended that forty-six airports be built in the section, believing this number to be sufficient to serve aeronautical needs until 1965. Two methods urged last month for remedying the Manhattan lack of airport facilities were the establishment of a base on Governor's Island, with shuttle service from larger airports, or the development of airports in New Jersey, Queens, the Bronx or Brooklyn, with a waterfront seaplane service wherever needed.

Airport Observes Tenth Birthday

EDDIE MARTIN'S Airport at Santa Ana, Calif., recently celebrated the tenth anniversary of its founding. The anniversary marked the completion of ten years of continuous operation without a serious accident to passenger, personnel or equipment. Starting in 1923 with a Jenny as equipment and eighty acres of flat land three miles south of Santa Ana as a field, the airport is now a well drained field, equipped with boundary and obstruction lights and a revolving beacon, and has a Department of Commerce rating of C-3-D. Six hangars and complete repair facilities are available, and a Ryan B-5 and a Waco F are successors to the Jenny. Mr. Martin is now an American Airways pilot, and his brother, Floyd Martin, is manager of the airport.

Since 1923 the ships belonging to the airport are reported to have been flown 9,655 hours, covering 775,750 miles. Students have totaled 3,128 hours in solo time, 29,693 trips have been made from the field, and 14,325 pay passengers have been carried in planes, exclusive of several privately owned planes which use the airport as a base.

Weather Contract Awarded to Airport

CONTRACT for the weather observation flights in the Cleveland, Ohio, territory has been awarded to the Euclid Avenue Airport, located at Willoughby, Ohio. The field is owned and operated by Euclid Avenue Airport, Inc., headed by S. R. Sague, president; C. Lewis, vice president, and W. W. Francis, secretary and treasurer. Operations on the weather flight contract will begin July 1, when Clifford March starts the first flight. Fulfillment of the newly awarded contract calls for a daily flight at approximately 5:30 every morning. An altitude of 17,000 feet must be gained before observations can be made. Mr. March

will make his base of operations at Sky-Ways, Inc., at the Cleveland Airport.

Euclid Avenue Airport also operates a cross-country charter service and an aviation school, of which Mr. March is chief pilot and instructor. In addition, the airport specializes in aerial advertising and also maintains a Great Lakes Aircraft sales and service.

A Busy Air Express Clearing House

OVER 25 per cent of the air express flown in the United States is cleared through the San Francisco Bay Air-drome, according to a recent report of the Department of Commerce Aeronautics Branch. Not only was the airdrome an extremely busy air express clearing house last year, but one of the several transport lines using the airdrome's terminal facilities carried an extraordinarily large amount of air express. The record-breaking line, the Varney-Air Ferry Service, between July 1 and December 31, 1932, flew 151,610 pounds of air express between the airdrome and Pier No. 5, San Francisco.

Kentucky Field Receives A-T-A Rating

BOWMAN FIELD, Louisville, Ky., has been designated an A-T-A field, according to the Department of Commerce, it was reported recently.

Bulletin Descriptive of Range Beacons

A LOOSE-LEAF publication containing detailed data regarding the location of radio range beacon facilities with respect to airports is being prepared by the Aeronautics Branch of the Department of Commerce. The information, to be designated as Airway Bulletin No. 3, will be available to pilots who make regular use of the Federal airways system facilities.

Kansas Airport to Be Continued

WHEN the Department of Commerce lease on the airport at Ottawa, Kans., expires July 1, the port will not be abandoned. The City of Ottawa has agreed to pay for the operation of the lights for three months, and J. M. Conard, on whose ground the field lies, will maintain the field, taking return from rentals as his pay. Ottawa has one of the few fields in the section now equipped for night landings.

Airport Dedicated at Palestine, Texas

THE PALESTINE, Tex., \$30,000 municipal airport was officially opened June 10. The field was formally dedicated by A. M. Burns, president of the Palestine Chamber of Commerce. The newly opened airport comprises 285 acres about six miles west of the city and is equipped with a \$10,000 steel hangar.

Waco Sales at Roosevelt Field Expands

HOWARD AILOR of Waco Sales of New York, Inc., has taken over Hangar 11, which adjoins his other hangar at Roosevelt Field, Mineola, L. I., N. Y. This expansion was made necessary by the increase in business since the first of the year, it was announced. Mr. Ailor has reported that more sales were made by his company during the first half of 1933 than in the entire year of 1932. The company plans to install new quarters for patrons, including lounging space for women fliers.

Newark Buildings' Contract Awarded

CONTRACT for the erection of a hotel, bus terminal, service station and garage adjacent to Newark (N. J.) Airport was awarded recently to Thompson Starrett Co., Inc., of New York, N. Y. As described in the October AERO DIGEST, the land for the buildings has been leased by the Airport Hotels Corp. from the City of Newark for fifty years. A delay in obtaining clear title to the land has held up plans for the construction for several months.

The hotel, which is to be of fireproof construction, will be only fifty feet in height to avoid obstruction to airplanes using the airport. Plans for the hotel are reported to provide for 110 rooms and baths and several lounges and shops. The bus terminal will be of semi-fireproof brick construction, two floors in height, with observation parlors and offices on the second floor and an observation deck located on the roof. The auto service station and garage will be one-story, of similar construction, the latter having a capacity for 150 cars.

Airline Offers Storage Facilities

IN ORDER to give special service to private airplane owners who fly into Chicago for A Century of Progress, American Airways has opened one of its hangars at the Chicago Municipal Airport to private fliers, offering service and storage. Under the direction of L. A. Slaughter, head of the sales department of the airline, twenty-four-hour service is offered to plane owners, with storage in a heated hangar and with experienced, licensed mechanics on hand to give service and make minor repairs. Facilities for instrument and propeller work are also available.

Airport Firm Appointed Distributor

AERONAUTICAL RADIO CO. of Roosevelt Field, Mineola, L. I., N. Y., has been made distributor for the Westport aircraft and airport radio receivers, it was announced recently.

Missouri Fields Are Dedicated

DEDICATION of Myers Field, Carthage, Mo., municipal airport, was held May 30. The field is named in honor of the late Mr. and Mrs. Allen Myers, who donated the tract to the city. A tile drainage system has been installed at the airport, and a deep well has been drilled which supplies an underground watering system for the flowers and shrubs around a memorial gateway.

Eads Airport was formally dedicated recently at Iberia, Mo., in the Ozark foothills. Its owner is J. A. Eads, a local aviation enthusiast, who purchased the land and equipped the field, which has two runways.

Gas and Oil Concession Obtained

THE GASOLINE and oil concession at the county airport for a twelve-month period has been officially awarded to the Pittsburgh-Butler Airport, Inc., it was announced recently by H. S. Martin, president of the company. Pittsburgh-Butler Airport, Inc., is owned jointly by the Pittsburgh Aviation Industries Corp., which operates Pennsylvania Airlines, Inc., and Transcontinental & Western Air, Inc.

Immediate reductions in the prices of all grades of gasoline are being put into effect. Texaco, Standard and Gulf are stocked continually, including 87-octane. Also, a staff is provided to perform incidental services such as cleaning planes and doing minor repairs.

Negotiations are now under way with the county officials to secure further inducements to make the airport more attractive to visiting pilots. These include free overnight storage with the purchase of certain minimum quantities of gasoline and oil.

Flying Service Located at Racine

ED HEDEEN is establishing flying headquarters on the lake front at Racine, Wis. Associated with Mr. Hedeem in the venture is H. F. Johnson, Jr., of Racine. Mr. Hedeem formerly operated planes from the Kenosha municipal airport.

Mulzer Service Opens New Base

ACTIVITIES at the Curtiss-Wright airport north of Milwaukee, Wis., have been resumed as the result of the signing of a contract by the Mulzer Flying Service, Inc., for use of the field and for hangar space.

The Mulzer service, of which Maj. Leslie G. Mulzer of Wisconsin Rapids, Wis., is president, will operate a fourteen-passenger trimotor Ford, a three-place Pitcairn autogiro and a three-place Wright Waco from the field. It will engage in sightseeing and cross-country flights. The personnel includes Major Mulzer, Mel Swanson, pilot and operations manager; Dick Hunter, pilot and

parachute jumper, and Miss Virginia Whittlesey, transport pilot. Plans call for an aerial circus each Sunday afternoon with racing, parachute jumping and acrobatics.

Major Mulzer will continue to operate the Nepco Tri-City airport at Wisconsin Rapids.

Elgin, Ill., Field Has New Manager

ARVILLE SCHROEDER, formerly connected with Air City, Racine, Wis., has been named manager of the municipal airport at Elgin, Ill., where he is conducting a flying and ground school.

Wisconsin Field Is Reopened

THE WATERTOWN, Wis., airport has reopened with Clarence Schimmel as manager. William McBoyle, pilot, who has been at the port for several summers, will again be at the field. It is reported that several more planes will be stationed at the airport this summer.

Flight Periods Reserved in Advance

THROUGH a new policy adopted by Cecil Pounder at the Pounder Airport, Portland, Ore., both students and passengers may register in advance the hour at which they wish to fly. Planes will be warmed up and ready for the take-off when the passenger arrives for the hop reserved.

Wings Corporation Official Appointed

MAJ. VICTOR DALLIN has become operations manager for the Wings Corp., which conducts its flying activities from Wings Field, Blue Bell, Pa.

Iowa Landing Field to Be Established

A GOVERNMENT landing field of ninety acres will be located at or near the present emergency landing field near the Nebraska-Iowa state line and in the vicinity of Atlantic, Iowa.

Landscaping Program for Ohio Field

PORT COLUMBUS, Ohio, is to be beautified with perennial flowers, shrubs and young trees and 100 acres of blue grass sod, under a program proposed by Emerson Betz, city park superintendent, and approved by Service Director William P. Helenkamp.

Annapolis Seaplane Base Planned

HARWOOD B. FOWLER is reported to be planning establishment of a seaplane base, to be known as the Severn Beach Seaplane Base, Severn Beach, Annapolis, Md. Mr. Fowler has been engaged in giving instructions to members of the Annapolis Flying Club, organized more than a year ago. In connection with the establishment of the seaplane base, Mr. Fowler plans construction of a hangar within the next few months.

San Francisco Night-and-Day Service

TWENTY-FOUR-HOUR ticket service for air transport planes operating from the San Francisco Bay Airdrome is now available to San Francisco patrons. Miss Alfreda Mosher, district manager of the Air Lines Consolidated Ticket Office, 439 Pine Street, San Francisco, has announced a new day-and-night telephone service which provides travelers with an opportunity to obtain aerial information and reservations.

Joe Long of the J. F. Long Co., aeronautical engine repair service at the airdrome, recently reported that his organization was rushed with business. Several emergency jobs and the regular routine of servicing have resulted in the operation of double shifts at the company's hangar.

Des Moines Airport Dedicated

A TWO-DAY AIR SHOW was scheduled for June 23 and 24, to dedicate the Des Moines, Iowa, municipal airport. Dedication ceremonies were under the auspices of The American Legion, cooperating with the Chamber of Commerce.

Oklahoma City Air Terminal

THE MUNICIPAL Air Terminal of Oklahoma City, which was dedicated May 13, is a four-story building, equipped with modern conveniences, lighting and radio equipment. It is located on the city's 640-acre airport, which was opened for operations April 1, 1932.

Oklahoma Air Service Elects Officers

CLINT T. JOHNSON has been re-elected president of the Oklahoma Aviation Service, Inc., at the Oklahoma City air terminal. Mr. Johnson was the first manager of the municipal airport. Other officers named at the annual stockholders' meeting included William Bleakley and Harvey P. Everest, vice presidents; Dorothy Pressler, secretary, and Todd Nelson, treasurer. Directors are the officers and Arch Dixon and Clem Constant.

Nebraska Airport Made Ready

A NEW and larger landing field is being prepared at Sidney, Neb., and lights and other equipment have been installed. An operator will be stationed at the field. The Sidney Chamber of Commerce is attempting to back a company in establishing a regular airline from Denver to the Black Hills district of South Dakota, with Sidney as the central point.

Birmingham Field Observes Anniversary

THE SECOND ANNIVERSARY of the opening of the Birmingham (Ala.) Municipal Airport was celebrated June 3 with a carnival featuring aeronautical stunts and other events. A banquet, given by the Aero Club, followed.

. AIRLINES and AIR TRAVEL .

Twenty-Hour Transcontinental Service

A TWENTY-HOUR eastbound coast-to-coast schedule and a 4¾-hour service between Chicago and New York featured the introduction of new schedules last month by United Air Lines on its New York-Chicago-Pacific Coast air mail, passenger and express airway. Westbound, coast-to-coast time is scheduled at 21½ hours, and 5½ hours between New York and Chicago. With the authority of the Post Office Department, the company placed in service on June 11 a fleet of thirty new-type low-wing Boeing Wasp-powered transports, and with the delivery of twenty more aircraft on its contract with the Boeing Airplane Co., will speed up its service on the Chicago-Kansas City-Texas and Seattle-San Diego routes.

Three round-trip schedules daily were placed in effect on the coast-to-coast mid-continent route with the new high-speed twin-engined monoplanes. Service between Chicago and New York was expanded from six to eight daily round trips, all but two of the schedules being operated with the new Boeings.

Actual flying time of the coast-to-coast trip between the Pacific and Atlantic is approximately seventeen hours. The new type Boeing transports, with full load of ten passengers, crew of two pilots and stewardess, mail and express, maintain a cruising speed of 170 miles an hour. Simultaneously with the inauguration of the high-speed schedules on its mid-continent route, United Air Lines started a schedule with a tri-motored Boeing between Chicago, Moline, Iowa City and Omaha, with one round trip daily.

Chicago United Traffic Breaks Records

UNPRECEDENTED air traffic from the Chicago municipal airport during June has been reported by United Air Lines. During the period from June 1 to June 14, planes of United carried 1,500 passengers from Chicago alone, while in the same period of 1932, 870 passengers were transported from the city by the company's aircraft. This represents an increase of seventy per cent over the 1932 outbound traffic from Chicago. Extra sections are becoming the rule rather than the exception on the Chicago-New York division of the company's coast-to-coast route.

Scrip Issued for Cheaper Air Travel

ENABLING further reductions in the cost of air transportation, American Airways last month began issuance of scrip books redeemable for transportation on all divisions of the company's nationwide system, L. D. Seymour, president, announced. The books represent a saving of fifteen per cent in costs of transportation, excess baggage, excess valua-

tion and ground transportation in all cities where American Airways operates its own limousine service, Mr. Seymour said.

Arrangements can be made to have the books transferable between employees of the purchasing company, and the scrip books also may be made transferable between members of a family. Coupons from scrip books are accepted in exactly the same manner as cash, or scrip and cash may be accepted in combination.

How to Keep Cool While Traveling

DURING recent hot weather, temperatures of about 100 on the ground were reported as accompanied by thermometer readings of 50 to 60 in the cabins of the multimotor transports of the airlines. Pilots, seeking maximum comfort for their passengers, flew at altitudes ranging from 10,000 to 14,000 feet. Instances were reported where heaters were necessary to maintain comfort aloft while 98- and 104-degree temperatures prevailed on the ground.

Pennsylvania Airlines Alters Flights

SEVERAL CHANGES were made effective in Pennsylvania Airlines schedules last month. These changes will enable travelers from Pittsburgh, Washington and Akron to reduce their travel time to points north and west by several hours. In addition, a direct connection is made at the company's Washington terminal for southern points, which will enable passengers to reach Florida in one day.

The airline recently added a Pitcairn PA-8 to its fleet. This plane is equipped with complete blind-flying instruments and radio and will be placed in service on the company's night mail run.

Airlines Use Socony-Vacuum Products

TWO MILLION GALLONS of Socony-Vacuum Corp. Aviation Mobilgas, with climatic control, are used by the American Airways, Inc., exclusively on its eastern lines, according to the Socony-Vacuum company. Socony-Vacuum Corp.'s Aviation Mobilgrease is being used for rocker arm lubrication in the new United Air Lines twin-engine Boeing transport airplanes.

Mrs. Roosevelt Flies on Long Air Trip

MRS. FRANKLIN D. ROOSEVELT made an air trip totaling over 5,600 miles from Washington, D. C., to California and return last month. During the week of June 4 she passed over or stopped in fourteen states, by airline, flying about half the distance at night. Among the airline systems used on the flight were Eastern Air Transport, Transcontinental & Western Air, United Air Lines and American Airways.

New Air Mail Superintendent

EARL B. WADSWORTH has been succeeded as superintendent of the Air Mail Service of the Post Office Department by Stephen A. Cisler. Mr. Wadsworth has become assistant superintendent of the Railway Mail Service. Mr. Cisler was assistant to Mr. Wadsworth for two years.

TWA Inaugurates Fast Chicago Service

A LIMITED airplane service between New York and Chicago, stopping only at Philadelphia and Pittsburgh, was inaugurated last month by Transcontinental & Western Air, Inc. This service, designed to offer additional air travel facilities in connection with A Century of Progress exposition at Chicago, operates in both directions in addition to the company's regular services which serve intermediate points.

The westbound plane, "The Air Century," leaves New York at 12:01 p. m., Philadelphia at 12:50 p. m., Pittsburgh at 3:23 p. m., and arrives at Chicago at 6:00 p. m., Central Standard Time. The eastbound plane, "The Pennland," leaves Chicago at 1:00 p. m., Pittsburgh at 5:35, Philadelphia at 7:48 and arrives in New York at 8:32 p. m., Eastern Standard Time.

Establishment of similar limited services is being planned by TWA over other sections of the airline as traffic volume warrants their inauguration, according to Richard W. Robbins, president.

Eastern Air Orders More Condors

FOUR ADDITIONAL Curtiss-Wright Condors of the 1933 type have been ordered by Eastern Air Transport, Inc., making a total of nine of these craft now ordered by this airline, it was announced last month by Harold A. Elliott, vice president and general manager. Three of the new craft have been delivered and two more are expected by July 1, he stated, completing the original order of five. The other four are now being produced in the Curtiss Airplane Co.'s plant in St. Louis, Mo. With the complete fleet of nine, the company will operate fourteen Curtiss Condors as well as a number of Stinsons and Kingbirds, a total of over fifty airplanes.

Schedule changes are expected to be announced by Eastern Air Transport over its New York-Washington and New York-Atlantic City routes effective July 1, when the new Condors will go into regular operation. As additional planes are delivered and are approved for acceptance, schedules over the New York-Atlanta and New York-Miami trunk airways operated by Eastern Air Transport will be considerably revised, it was said.

Airlines Gain in Passengers and Miles

A TOTAL of 29,499 passengers was carried in April by scheduled airlines operating in continental United States, according to reports from the twenty-five companies operating during that month, it was announced last month by the Aeronautics Branch of the Department of Commerce. Although the number of lines was fewer, the number of passengers was greater than in any preceding month this year.

The scheduled airlines flew 3,755,159 miles, carried 111,620 pounds of express and flew 9,347,303 passenger miles during April, all but the express classification showing gains over the first three months of the year. Express figures were exceeded only by those for March and revealed a large gain over April, 1932, when express poundage totaled 79,275.

Air Express Service to Uruguay

ANNOUNCEMENT was made last month by officials of the Pan American Airways System that merchandise shipments by air may now be consigned to Montevideo, Uruguay, on the seven-day schedule provided three times a week by American air mail lines to South America. In place of the numerous documents required for ordinary international shipments between the United States and Uruguay, only one form, the standard Pan American Airwaybill, is necessary for air express shipments. This form takes the place of commercial invoices, consular invoices and receipts, bills of lading and the numerous documents formerly required. Official provision has likewise been made for rapid clearance of air express consignments through Customs to assure delivery of American merchandise into this market with the least possible delay.

Uruguay is the thirty-first country with which the Pan American Airways System has effected agreements for the transmission of merchandise to and from the United States by air.

TWA Accelerates Mail Schedules

TRANSCONTINENTAL & Western Air announced last month a reduction of ninety minutes in its westbound coast-to-coast mail schedules and a reduction of one hour in the eastbound transcontinental mail schedules. The reductions were made possible by the use of Lockheed Orions, with cruising speeds of 170 miles per hour, on the night service west of Kansas City. Under the new schedules, mail destined for Los Angeles will arrive at 7 a. m. instead of 8:34 on the westbound schedules. Mail from Los Angeles to the East will leave at 10:15 p. m. instead of 9:15, and it will arrive in New York at 11:07 the next night, as formerly.

The coast-to-coast schedules for air mail on the mid-transcontinental route are now twenty-two hours eastbound and twenty-five hours westbound.

Airline Shows June Traffic Gain

AMERICAN AIRWAYS' passenger traffic for the first seven days of June showed an increase of over seventy per cent over the first week in May, record month of 1933, L. B. Manning, chairman of the board of the company, has announced. In the seven-day period, American Airways carried a total of 2,653 revenue passengers as compared with 1,672 passengers during the first week of May, Mr. Manning said.

Braniff Airways Changes Schedules

DUE to increase in traffic since the recent rate cut, Braniff Airways, Inc., has revised its schedule between Oklahoma City, Kansas City, St. Louis and Chicago, Paul Braniff, manager, has announced. The schedule changes, which give Oklahoma City three trips daily to Chicago, were effective June 1.

Montreal-New York Schedule Changed

AMERICAN AIRWAYS' summer schedule between Newark Airport and St. Hubert Airport in Montreal on the Newark-Montreal-Canadian air mail line is now in effect, according to an announcement by Warren Oakes, vice president in charge of traffic. This schedule provides for a later afternoon departure from Montreal at 4:15 p. m., with arrival in Newark at 7:55 p. m.

Twenty New Condor Transports Sold

THOMAS A. MORGAN, president of Curtiss-Wright Corp., announced on June 9 the sale of twenty of the new fifteen-passenger Curtiss-Wright Condor transport biplanes, amounting to \$1,250,000. Nine have been delivered and are now being operated by American Airways and Eastern Air Transport. American Airways is flying these ships on its Chicago-Detroit-Buffalo-and-New York run, and Eastern Air Transport on its lines between New York and Miami. The purchase of additional transports for service on both American Airways and Eastern Air Transport has resulted from the satisfactory performance of the new Condors in operation, it was stated.

California Airline Opens Service

DAILY express service between the San Francisco Bay region, Sacramento, Marysville and other cities in the Sacramento valley has been established by the Trans-Air company, located at Curtiss-Wright Alameda (Calif.) airport. George McCallum is president of the company, which uses a Curtiss Thrush in its air service.

Milwaukee Club Chosen Kohler Agent

THE KOHLER Aviation Corp. has named the Milwaukee Motor Club its general agent for Milwaukee, Wis. Harold Callahan, former traffic manager for Kohler, has taken charge of the club's aviation and travel bureau.

Air Service to New England Inaugurated

A CHARTER SERVICE operated by the Island Airways division of Maine Air Transport in connection with the New England Steamship Co. was opened last month between New York, N. Y., and Fishers Island, N. Y.; Martha's Vineyard, Cape Cod and Nantucket, Mass., and Newport, R. I. Fairchild 71's, on pontoons and powered with Wasp engines, are used as equipment. It was anticipated by the company last month that a commuter's schedule would be inaugurated soon, stopping at Sag Harbor, N. Y.; Newport, Fishers Island and New Bedford, Mass.

Further Survey of Transatlantic Route

ANNOUNCEMENT was made last month by J. T. Trippe, president of the Pan American Airways System, that a special expedition is being sent by the company this summer to make further detailed technical surveys of certain sections of the northern transatlantic route. The expedition has for its objective the supplementing of data already assembled by the airline. This work is being carried out, it is reported, in association with European international airlines now also engaged in similar research.

The S. S. *Jelling*, under special charter of the company, was scheduled to sail from New York the latter part of last month with the technical personnel, headed by Maj. Robert A. Logan of the Pan American Airways staff. The ship, which is to carry supplies and technical equipment, including an airplane, will also serve as a base for supplemental surveys from the air. The steamer will be equipped with special aircraft radio equipment, including a direction finder, of the type developed by Pan American and successfully used on the system's lines in Latin America and Alaska.

The expedition will proceed first to Labrador, and later surveys will be made, it is planned, on both the east and west coasts of Greenland, and will possibly continue to Iceland.

Present plans also contemplate that a plane, flying from New York, will form a contact with the *Jelling* at a later date to carry out the supplemental aerial surveys and photographic work. It was stated at the Pan American office that if it is possible for him to leave for a sufficient length of time, Col. Charles A. Lindbergh, technical adviser to the Pan American Airways System, may take personal charge of the survey flying in Greenland and Iceland.

AVIATION ENGINEERING

TECHNICAL EDITORS: PROF. ALEXANDER KLEMIN • DR. MAX MUNK • DR. MICHAEL WATTER

• With this issue AERO DIGEST combines its technical features and departments with the newly-acquired engineering facilities of **Aviation Engineering** magazine, formerly the only exclusively technical aeronautical publication in America. This combination eliminates much duplicated effort and provides a concentration of the published sources of technical information heretofore presented by both publications individually.

In addition to selected technical articles by various contributors, feature articles will be presented by the engineering editors—Prof. Alexander Klemin, editor of the former **Aviation Engineering** and in charge of the Guggenheim School of Aeronautics, New York University; Dr. Max M. Munk, professor at Catholic University, Washington, D. C.; and Dr. Michael Watter, who for many years has been a contributing editor to AERO DIGEST.

Proportioning Tail Surfaces for Heavily Loaded Airplanes

ALEXANDER KLEMIN

Professor of Aeronautical Engineering, New York University

• In two previous articles, "The Longitudinal Stability Coefficient," *Aviation Engineering*, Nov. 1929, and "Longitudinal Stability for Very Large Airplanes," *Aviation Engineering*, Dec. 1929, we have discussed some applications of the theory of dynamical stability to practical design.

With the heavily loaded machines of today, it appears desirable to examine anew the question of tail surfaces dimensions. If a heavily loaded machine is geometrically similar to a dynamically stable lightly loaded machine, it is not at all certain that the heavily loaded machine will have sufficient dynamic stability.

The equations of longitudinal motion of an airplane reduced to their simplest forms and referred to an airplane of unit mass are

$$\frac{dw}{dt} = q U + w Z_w$$

$$K_B^2 \frac{dq}{dt} = w M_w + q M_q$$

where

- w = velocity along the normal axis
- U = velocity along the thrust or body axis
- w Z_w = change of normal force due to w
- K_B = radius of gyration about the transverse axis
- w M_w = change of moment about the center of gravity due to w
- q = angular velocity about the transverse axis
- q M_q = damping moment due to the angular velocity q

It can be shown that the solution of this equation gives roots

$$\lambda = \frac{(M_q + K_B^2 Z_w) \pm \sqrt{4 K_B^2 (M_q Z_w - M_w U) - (M_q + K_B^2 Z_w)^2}}{2 K_B^2}$$

A period of an oscillation.

$$T_1 = \frac{2 \pi}{\sqrt{\frac{4 K_B^2 (M_q Z_w - M_w U) - (M_q + K_B^2 Z_w)^2}{2 K_B^2}}}$$

and a time to damp to half amplitude

$$T_2 = \frac{.69}{\left(\frac{M_q + K_B^2 Z_w}{2 K_B^2} \right)}$$

It also can be shown that as the loading per square foot w is varied, then at the same angle of incidence

1. U ∝ √w
2. Z_w ∝ $\frac{1}{\sqrt{w}}$
3. M_w ∝ $\frac{1}{\sqrt{w}}$
4. M_q ∝ $\frac{1}{\sqrt{w}}$
5. and assumed that K_B remains sub-

stantially unchanged. Further, we know that

1. M_q is negative
2. Z_w is negative
3. M_w is negative
4. U is negative
5. K_B is positive

With these facts, and inserting appropriate figures in the equation for T₁ we find that with increase in w, the time of oscillation becomes shorter, or the oscillation more rapid. There are conflicting factors, however, and the change in period of oscillation T₁ is not marked.

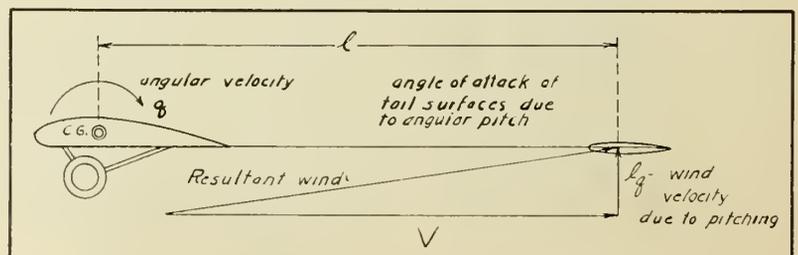
If we turn to the equation for time to damp to half amplitude.

$$T_2 = \frac{.69}{\frac{(M_q + K_B^2 Z_w)}{2 K_B^2}}$$

we find no conflicting factors, since both

M_q and Z_w vary as $\frac{1}{\sqrt{w}}$. Therefore, as

the machine is more heavily loaded both M_q and Z_w decrease, and the time to damp to half amplitude will increase



sharply.

A more heavily loaded machine therefore, needs more M_a (since Z_w cannot be changed) or more tail damping, in other words, larger tail surfaces or a longer tail arm, or a combination of both.

The same arguments will apply to lateral dynamic stability, and a similar mathematical process could be established, although the treatment would be lengthier.

Designers who use certain relative proportions in designing their craft, and pass on to more heavily loaded machines of the same general proportions are therefore advised to consider whether horizontal and vertical surfaces should not be increased in relation to other dimensions of their machines. It should also be remembered that if vertical tail surfaces are increased, the wing dihedral should be proportionately increased.

An Alternative Argument

The difficulty of the dynamical stability of airplanes from a practical designer's point of view is the terminology employed. The above mathematical treatment has been reduced to its simplest elements, yet is still unpleasant. Perhaps the following will be more palatable.

Suppose the more heavily loaded machine is given the same angular velocity in pitch as the more light machine at the same angle of incidence. Since the moment of inertia is proportional to the gross weight, the kinetic energy of the motion is also proportional to the weight or loading per square foot and is correspondingly greater. We can say that for a given angular velocity, the kinetic energy of the displacement is proportional to the square of the speed.

The force on the tail surfaces is also proportional to V^2 but the relative change in angle for the tail surfaces is proportional to

$$\frac{(\text{angular velocity } q) (\text{tail arm } l)}{(\text{forward velocity } V)}$$

as is illustrated by the sketch.

Hence the damping of the tail surfaces.

$$a \frac{V^2 (\text{angular velocity}) (\text{tail arm})}{V}$$

The kinetic energy of disturbance increases with the loading and hence the square of the speed, the damping increases as the speed only.

With the same aerodynamic form, the more heavily loaded machine is relatively less damped.

Pilot's reports of "hunting" in heavily loaded ships also bears out our general argument.

Technical Meetings at A Century of Progress Exposition

● A number of interesting technical sessions will be conducted at the Palmer House, Chicago, Ill., headquarters of the A. S. M. E. for their meeting from June 25th to July 1st.

Many of the papers to be read will deal with aerodynamics, aeronautics, aeronautic vibration and construction and others with applied mechanics, fuels, research and similar subjects allied with aeronautics. The following list shows the titles of papers which are of particular interest in the aeronautic field, together with their authors and present business affiliations:

Monday, June 26.
Aerodynamics (I).

Auspices of Aeronautic Division.

Presiding officer: A. Klemin, Secretary, A. S. M. E. Aeronautic Division, and Director Aeronautical Engineering, Guggenheim School of Aeronautics, New York University, New York, N. Y.

Staff representative: Professor Daniel Roesch.

The Use of the Wind Tunnel in Connection With Aircraft Design Problems, Th. von Kármán, Mem. A. S. M. E., Director, and Clark B. Milliken, Assoc.-Mem. A. S. M. E., Assistant Professor of Aeronautics, California Institute of Technology, Pasadena, Calif.

Some Studies on the Flutter of Airfoils and Propellers, W. Harold Taylor, Mem. A. S. M. E., Ann Arbor, Mich.

Airplane Wing Profiles With a Given Initial Moment, C. Witoszynski, Aerodynamics Institute, Warsaw, Poland (Presented by F. W. Pawlowski).

Aerodynamics, C. Wieselberger, Technische Hochschule, Aachen, Germany (Presented by William H. Miller, Mem. A. S. M. E., Research Chief, B/J Aircraft Corporation, Baltimore, Md.).

Aerodynamics (II).

Presiding officer: E. E. Aldrin, Mem. A. S. M. E., Standard Oil Company of New Jersey, New York, N. Y.

Staff representative: Professor Daniel Roesch.

Zap Flaps and Ailerons, Temple N. Joyce, President, B/J Aircraft Corp., Baltimore, Md.

Introduction to the Spin, A. Klemin, Secretary, A. S. M. E. Aeronautic Division, and Director Aeronautical Engineering, Guggenheim School of Aeronautics, New York University, New York, N. Y.

Rules for the Construction of Airplanes, A. Volmerange, Bureau Veritas, Paris, France (Presented by A. Klemin).

Aeronautics.

Presiding officer: Carl B. Fritsche,

Mem. A. S. M. E., Metalclad Airship Corp., Detroit, Mich.

Staff representative: Max Welborn. Aircraft-Engine Cooling Problems, Harold Camenez, Allison Engineering Co., Indianapolis, Ind.

Some Factors Regarding Propellers for Airships, Fred E. Weick, Senior Aeronautical Engineer, National Advisory Committee for Aeronautics, Langley Memorial Aeronautical Laboratory, Langley Field, Hampton, Va.

Safety Maintenance Manual for Aeronautics (Report of Special Committee on Aircraft Safety and Inspection), Jerome Lederer, Assoc.-Mem. A. S. M. E., Chief Engineer, Barber & Baldwin, New York, N. Y.

Tuesday, June 27.

Aeronautic Vibration.

Presiding officer: E. A. Sperry, Jr., Vice-Chairman, A. S. M. E. Aeronautics Division, and Vice-President, Sperry Products, Inc., Brooklyn, N. Y.

Staff representative: Professor Daniel Roesch.

Noise Elimination in Transport Airplane, P. E. Bassett and Z. J. Zand, Sperry Gyroscope Co., Brooklyn, N. Y.

Shock-Absorbing Panels for Instrument Mountings, Charles H. Dolan, Mem. A. S. M. E., Vice-President in Charge of Operations, Eastern Air Transport, Inc., Candler Field, Atlanta, Ga.

Air Sickness, L. H. Bauer, M.D., Consulting Specialist in Aviation Medicine, Hempstead, N. Y.

Aeronautic Construction Symposium.

Presiding officer: William B. Mayo, Chairman, A. S. M. E. Aeronautic Division, Detroit, Mich.

Staff representative: Max Welborn.

Fundamental Principles of Design of Fittings for Metal Monocoque, J. E. Younger, Professor of Mechanical Engineering, University of California, Berkeley, Calif.

The Resistance Welding of Aluminum and Its Alloys, D. I. Bohn, Aluminum Company of America, and G. O. Hoglund, Jun. A. S. M. E., Aeronautical Engineer, Aluminum Company of America, New Kensington, Pa.

Stainless Steel in Aircraft Construction, Frederic Flader, Aeronautical Engineer, Curtiss Aeroplane and Motor Co., Buffalo, N. Y.

Aircraft Design as Influenced by Accidents, Richard C. Gazley, Chief, Engineering Section, Aeronautics Branch, Department of Commerce, Washington, D. C.

It is hoped that some of these papers can be presented in abstract form or in their entirety in forthcoming issues of AERO DIGEST.

The Influence of Racing Types on Commercial Aircraft Design

● The Granville Gee Bee Transport Model C-8 is the result of experience in aerodynamic and structural design and practice that has proved itself on the greatest of all proving grounds—the race course. In the years that we have been connected with aviation as pilots, mechanics and engineers, we have been able to collect an invaluable store of experience and information that enabled us to build the 1932 Gee Bee Supersportster in which Major James Doolittle succeeded in bringing the world's landplane speed record of 294.38 miles per hour back to America. The lessons learned in this racing game are of value to the commercial builder.

The two greatest requirements in commercial craft are speed and durability. The streamline shape that proves superior in a fast racing ship is obviously better for commercial use. Structural design that will withstand the terrific abuse of the race course will, in all probability, prove durable when used in a commercial craft. For either racing or commercial craft, durability is a fundamental essential, and with this point in view it is obvious that the engine plays a very important part.

The most dependable high powered aircraft engines in the United States are of the radial air-cooled type, which to the layman's (and also many designers') point of view are highly undesirable from the point of streamlining and high speed. With the necessity of using a radial air-cooled engine because of its durability features, we began some years ago to investigate the possibilities of streamlining such an engine. Experiments led us to believe that it was possible to streamline an engine of this type in such a manner that it would have no more drag than any other type of engine of equal horsepower. We discovered that it was not nearly so much the frontal area and cross section of an object as the shape that counted for the desired low drag.

Our 1931 Gee Bee Supersportster was the first serious attempt to put into practice our theory in this respect. This job with its large frontal area, huge fuselage, presented an unusual appearance and brought hails of criticism from designers and pilots from all over the country.

Z. D. GRANVILLE
President, Granville Aircraft Corp.

Some predicted the ship would never fly; others predicted that if it did fly it had no possible chance of winning anything. In spite of this, the 1931 job brought home the Thompson Trophy and established a new American landplane speed record. The Gee Bee Supersportster of the following year was designed solely for racing purposes and to establish a new landplane speed record.

The appearance of this airplane with its large frontal area and huge fuselage, 61 inches in diameter, represented so radically a departure from the usual racing airplane that the design again evoked criticism from the aeronautical fraternity, in spite of the fact that we had proved our point on the 1931 ship.

To check our calculations on this job a scale model was built and tested in the New York University wind tunnel. This test proved our theory correct and the ship was built on the lines first intended.

In the following article I will try and cover the major reasons for our design on the various parts of the racing craft, and point out how we are applying the same principles to the commercial models we are now building.

The Engine

The engine selected for the racing job was the Pratt and Whitney "Wasp," Model T3D1, supercharged to 730 horsepower at 2,300 r.p.m. The ability of this power plant to develop a tremendous

overload of horsepower over an extended period of time, together with its horsepower weight ratio, gave this engine a great many advantages.

In the Model C-8 we are selecting the Pratt and Whitney "Hornet" for the same reason. Experience with racing craft in the past taught us that a propeller efficient at high speed is extremely poor on the get-away and take-off, which counts seriously in a race from a standing start and is particularly objectionable in a commercial job taking off with a heavy load. With this difficulty in mind we selected a Smith controllable-pitch propeller as the ideal installation which would give us the desired take-off, and still hold the motor down to the proper r.p.m. at the proper speed. With the same thought in mind we are using the Hamilton Standard controllable-pitch propeller on the transport job.

The Fuselage

For minimum profile drag coefficient, a streamline body of revolution should have a fineness ratio between 2 and 4. Also the maximum diameter should be located at about one-third of the length of the body. With these points in mind the Supersportster fuselage was laid out. The fineness ratio was set at 3.2 and the maximum body diameter was located at 34% of the fuselage length. The fuselage, of course, was not a body of revolution, but approached this. The sections



Miniature of the Gee Bee Model C-8 transport plane, descendant of the Gee Bee racer

Technical Articles Publications

GARDNER

to about 30% of the length were true circles. From this point aft, the section became ellipses, with the major axis vertical. The disposition of the cockpit near the tail necessitated this. Having plotted a curve of the drag coefficient against fineness ratio for a series of geometrically similar streamline bodies we found drag coefficient D_c (lbs./ft./m.p.h) reaches a minimum value at a fineness ratio of nearly 2 and increases above and below this fineness ratio. With a low drag coefficient, the fuselage cross-section area could be increased greatly over other type fuselages before the total drag is equal. This allows a large, comfortable cabin for the pilot, and an eye towards commercial aircraft permits the use of a roomy interior for passengers in use on airlines without sacrifice in aerodynamic efficiency. The passengers can now travel in greater personal comfort without increase particularly to them or the airline operator. The fuselage drag may be expressed in the form of a simple equation:

$$D_f = D_c \times A$$

where

D_f = total fuselage drag in pounds

D_c = fuselage drag coefficient in (lbs./sq. ft.)/mph²

A = maximum cross-section area of the fuselage (sq. ft.)

From data compiled for the comparison of the Supersportster fuselage with the fuselage of other well known types, it was obvious that by careful attention to the particular shape of the fuselage it was possible to get a lower drag coefficient per square foot of area with consequently low drag for the entire fuselage. This was important as far as the racing ship was concerned, but when taken into consideration from a commercial standpoint the beneficial results are two-fold:

First, a low-drag fuselage on our commercial job will result in better speed which means greater range, lower power required and also lowering of flying time on the ship with consequent reduction in operating cost.

Second, the possibility of using the large fuselage without added drag also allows us to build a cabin which is roomy and comfortable.

Wings and Tail Surfaces

For the selection of an airfoil for the wing, it was of course desirable to use one with a low minimum drag coefficient and suitable moment characteristics with a small total center of pressure travel. A high value of maximum lift coefficient was necessary to obtain a reasonably safe landing speed and quick take-off. In the racing airplane low drag is probably the most important factor, followed by suitable moment characteristics; while in the commercial job low drag is important

calibration. A simple nomogram with two examples is given which contains all the partial influences and makes possible an instantaneous determination of the actual dynamic pressure. It is shown that the Prandtl-tube does not possess the disadvantage of being affected by air temperature and pressure. Within the scope of present velocities, it is uninfluenced by viscosity, the true dynamic pressure keeping within sufficient accuracy at all Reynolds numbers.

Speedometer

A Speedometer which indicates True Airspeeds, T. Sasaki. Tokio Imperial University—Aeronautical Research Institute, No. 95, Vol. 7, No. 14, March, 1933, pp. 396-415, 12 figs., 7 tables.

performance, but high maximum lift with consequent good landing and take-off characteristics is most essential.

For the racing airplane the M-series of airfoils recommended themselves because of their low drag and small center of pressure travel. The drag of several of the M-series of airfoils at a constant value of lift coefficient was plotted against thickness in per cent chord at 30% chord. For this comparison, a value of lift coefficient equivalent to a speed of 300 m.p.h. of the full scale airplane was selected.

The lift coefficient equivalent to a speed of 300 m.p.h. is

$$C_L = \frac{L}{P/2 AV^2}$$

where:

L = Gross weight of the airplane (2,500 lbs.)

A = Wing area in square feet (75 sq. ft.)

P = Density of air (.002378)

V = Speed in ft./sec./300 \times 1.467 = 440 ft./sec.

Substituting these values in the equation:

$$C_L = \frac{2,500}{.002378 \times 75 \times 300^2 \times 1.467^2} = .1458$$

Seven of the M-type airfoils may be classified as the "stable series" of that series. The center of pressure travels towards the trailing-edge as the angle of attack is increased from low to high angle of attack. The M-6 section has the smallest total center of pressure travel, namely 9%. For the Supersportster wing, sufficient spar depth was possible with the ordinates of M-6 reduced to 65%. It is believed that the center of pressure travel is not altered by this change, but the minimum profile drag of the wing is reduced. In flight, the center of pressure

Airplane Design

Rational Aeroplane Design, G. H. Handasyde. Aircraft Engineering, Vol. 3, No. 51, May, 1933, pp. 101-104, 5 figs.

BEFORE EXAMINING possible means of improving the performance of airplanes, the author gives a brief résumé of what has been achieved in this direction since the World War. He outlines the chief requirements for a successful transport machine and discusses the weight allocated to non-structural parts. He takes up the possibilities of reducing head resistance and weight and shows the influence of the position of wing and landing gear. He considers that unless the engines can be housed completely inside the wing without having to alter the contour, it is better to take them away from the wing and suspend them from the undersurface. He concludes that it should be possible to arrange the engine nacelles in such a way as to provide the bulk of the fairing for wheels and undercarriage, and it might even be possible to withdraw the wheels from the nacelle without either heavy or trim alone throughout the entire speed range and with power on or off. It is therefore believed that a small center of pressure travel is a necessary characteristic in racing airplanes.

The airfoil for the transport job was selected in a very similar way except that we had to take into consideration the maximum lift, with a result that we selected the N.A.C.A. 2412. This airfoil had every desirable characteristic, but not sufficient spar depth. We therefore designed the wing tapered in plan form starting with the 2415 at the innermost rib and ending up with the 2409 at the tip. This gave us a wing with the high lift qualities of the thick section and the low drag qualities of the thinner section, at the same time aiding us structurally. We are using the same general structure design with plywood covering, covered in turn with cloth and dope that proved so rigid and durable on the racing job.

The tail surfaces of a racing airplane should be of sufficient area to permit adequate control at stalling speed and also be no larger than necessary because of parasite drag. Furthermore, large surfaces are apt to be over-sensitive at high speeds.

The tail surfaces were cantilever type of all wood construction, similar to the wing. They were designed for 75 lbs. per sq. ft. with margins of over 100%, which together with the method of attachment on the fuselage at widely separated points gives the desired rigidity. This construction was much heavier than necessary, but we wished to make sure to eliminate vibration due to flexibility.

The stabilizer area was 7.5 square feet. A fillet of 2-inch constant radius was

(Continued on page 68)

The Influence of Racing on Commercial Air

● The Granville Gee Bee Transport Model C-8 is the result of experience in aerodynamic and structural design and practice that has proved itself on the greatest of all proving grounds—the race course. In the years that we have been connected with aviation as pilots, mechanics and engineers, we have been able to collect an invaluable store of experience and information that enabled us to build the 1932 Gee Bee Supersportster in which Major James Doolittle succeeded in bringing the world's 1-

speed record. The National Aircraft Corp., located in the former Emsco factory at Downey, Calif., has produced a side-by-side dual control monoplane designed by W. B. Kinner who is well-known in connection with producing planes in this classification as well as the engines which power them.

Some of the principal objects were to develop a moderately-priced plane having easy control on the ground, safe flying characteristics (particularly good control at all speeds) and good vision both on the ground and in flight.

The new Security Airster is a low wing strut-braced monoplane with wire-braced tail surfaces and wide tread landing gear. The wing outer panels attach to a short stub center section braced to the fuselage by a member intended to transmit the oleo leg loads directly into the fuselage structure.

The fuselage structure is of chrome molybdenum tubing. The cockpit is roomy yet convenient for operation from either side and the instrument panel is plainly visible from both seats. The cockpit is protected by a special windshield making it unnecessary to wear goggles or helmet. The baggage compartment, large enough for two suit cases or 50 pounds, is located just behind the seats. A demountable coupe enclosure can easily be installed when desired.

The brake control enables the pilot to use the rudder as well as the brakes while taxiing. The brakes are operated by the rudder pedals and hand lever. When the rudder pedal on either side is depressed the brake operates on that side only. Brakes are operated from either side by pilot or student. When the hand lever is pulled all the way back it locks both

Some predicted the ship would never fly; others predicted that if it did fly it had no possible chance of winning anything. In spite of this, the 1931 job brought home the Thompson Trophy and established a new American landplane speed record. The Gee Bee Supersportster of

wheels, and holds the rudder in neutral. Semi-airwheels are used with Timken bearings.

The engine mount can be swung around at 90 degrees to enable the mechanic to make desired adjustments to the accessories on the rear of the engine, or the whole engine and mounting can be taken off intact. This makes it possible for a person to install another engine in a few minutes. Complete disassembly and re-assembly of the engine may be made without taking it out of

the plane as a unit.

Wings are constructed of spruce, with routed lightened beams and external bracing struts are arranged in a V to give rigidity. Double internal drag and anti-drag bracing add to the rigidity of the wings which are fabric-covered and doped. Frise-type ailerons assure light yet adequate control at all speeds.

The tail wheel has solid rubber tires and is arranged on a castor to swing in a 360-degree circle; it automatically swings parallel to the line of flight.

The engine fuel consumption results in an average rate of fifteen miles per gallon of gasoline, comparing favorably with an automobile in cost of operation.

The finish and colors are optional with the purchaser.

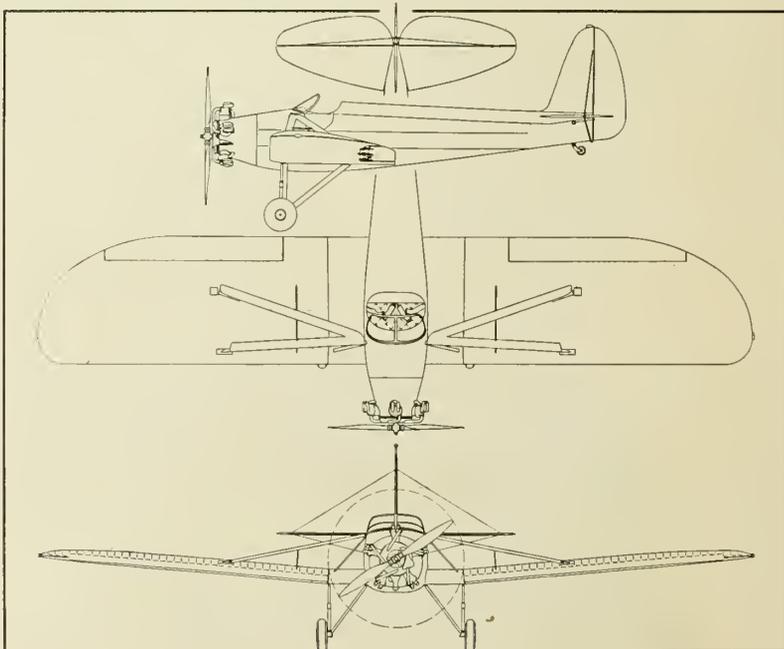
Z. D. GRANT
President, Granville

Standard Equipment

Standard instruments and equipment include tachometer, altimeter, oil pressure and temperature gauges, gasoline gauge, set of engine tools, log books, engine instruction book, map case, first aid kit and fire extinguisher.

Specifications

Wing span.....39 feet 6 inches
Wing chord.....7 feet
Length26 feet 6 inches
Height7 feet 9 inches
Landing gear tread.....9 feet
Engine, Kinner.....100 horsepower
Weight, empty.....1,150 pounds
Gross weight, loaded.....1,750 pounds
Useful load.....600 pounds
Wing loading.....6.75 pounds per sq. ft.
Power loading.....17.5 pounds per h.p.



Three-view outline drawings of W. B. Kinner's new Security Airster

Digest of Technical Articles from Foreign Publications

ELSA GARDNER

Wing Flutter

The Influence of Wing Density upon the Flutter of Aeroplane Wings, A. G. Pugsley. (British) Aeronautical Research Committee—Reports and Memoranda No. 1497, June 21, 1932 (published May 2, 1933), 17 pp., 7 figs.

THE EFFECTS of wing density upon both binary and ternary flutter are treated analytically and then illustrated by a numerical application of the theory to a particular example. Some consideration is also given to practical matters affecting the application of the theoretical results to actual aircraft. It was found that wing density could have an important influence upon flutter, particularly at low densities, and some general information on its effects upon critical speed and frequency was obtained.

Plywood

The Coefficients of Elasticity of Plywood (O współczynnikiach sprężystości sklejk), A. Grzedzielski. Instytut Badań Technicznych Lotnictwa (Institute of Aeronautical Research, Poland). Bulletin No. 10, 1932, pp. 26-30. In French and Polish.

CALCULATIONS are given for the coefficients of elasticity of plywood which are then compared with results published in *Zeitschrift fuer Flugtechnik Und Motorluftschiffahrt* and in *Luftfahrtforschung*. The relations between the coefficients and their variation according to the various systems of coordinates are studied.

The same issue of the Institute reports describes the results of research on spruce growing near Wisla, including experiments undertaken both in the field and in the laboratory.

Pressure Measurements

The Influence of Air Pressure and Temperature in Dynamic Pressure Measurements with Pitot Tubes (Einfluss von Luftdruck und Temperatur bei Staudruckmessungen mit Stauduesen), H. G. Kiel. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, No. 10, May 29, 1933, pp. 281-284, 6 figs.

THE TUBE FACTOR as a function of the Reynolds number and the influence of air pressure and temperature were investigated for four pitot tubes. It was shown that, especially for small dynamic pressures, by neglecting the effects of air pressure and temperature, considerable errors originated in measurements of dynamic pressures. These errors may be neglected when using venturi tubes but do not give accurate flight measurements. Atmospheric pressure and temperature must be taken into account for accuracy if measurements are carried out for other atmospheric conditions, as in the tube

calibration. A simple nomogram with two examples is given which contains all the partial influences and makes possible an instantaneous determination of the actual dynamic pressure. It is shown that the Prandtl tube does not possess the disadvantage of being affected by air temperature and pressure. Within the scope of present velocities, it is uninfluenced by viscosity, the true dynamic pressure keeping within sufficient accuracy at all Reynolds numbers.

Speedometer

A Speedometer which indicates True Airspeeds, T. Sasaki. Tokio Imperial University—Aeronautical Research Institute, No. 95, Vol. 7, No. 14, March, 1933, pp. 396-415, 12 figs., 7 tables.

A DIFFERENTIAL pressure-type airspeed indicator is described in which the variations of air density are compensated for. The ordinary aneroid diaphragm capsule which is deflected by the variations of air density is used in conjunction with the capsule for an ordinary pressure-type airspeed indicator. From the results of calibration in the low-pressure low-temperature wind tunnel, it has been shown that the new indicator very nearly indicates the true airspeeds.

Alloys

Investigation of Magnesium-Aluminum-Copper Alloys Rich in Magnesium (Etude des alliages magnésium-aluminium-cuivre, riches en magnésium), P. Bastien. Publications Scientifiques et Techniques du Ministère de L'Air, No. 20, 1933, 143 pp. 57 figs.

IN ADDITION to the investigation of magnesium-aluminum-copper alloys, a study is reported which was made of the casting properties of metals and alloys. The author gives a very precise sketch of the equilibrium diagram for magnesium-aluminum-copper alloys rich in magnesium, utilizing all the information furnished by the surfaces of the secondary crystallization and the heights of the eutectic points. The results of the thermal analysis were controlled, and by means of micrography, the study of hardness, density and electric conductivity was accurately made. The mechanical properties were investigated for the identification of the chemical composition, for rough alloys, die and sand cast and for drawn and forged alloys to prove that they had characteristics comparable to those of electrons. The results of chemical corrosion are defined as parallel to those obtained with salt water. This comparison shows the errors which arise from extrapolating the results obtained in the laboratory.

Airplane Design

Rational Aeroplane Design, G. H. Handasyde. Aircraft Engineering, Vol. 5, No. 51, May, 1933, pp. 101-104, 5 figs.

BEFORE EXAMINING possible means of improving the performance of airplanes, the author gives a brief résumé of what has been achieved in this direction since the World War. He outlines the chief requirements for a successful transport machine and discusses the weight allocated to non-structural parts. He takes up the possibilities of reducing head resistance and weight and shows the influence of the position of wing and landing gear. He considers that unless the engines can be housed completely inside the wing without having to alter the contour, it is better to take them away from the wing and suspend them from the undersurface. He concludes that it should be possible to arrange the engine nacelles in such a way as to provide the bulk of the fairing for wheels and undercarriage, and it might even be possible to withdraw the wheels into the nacelle without either heavy or elaborate gear.

Hydrodynamics

The Hydrodynamics of Marine Aircraft, J. H. Lower. Royal Aeronautical Society Journal, Vol. 37, No. 269, May, 1933, pp. 423-434, 9 figs.

STARTING with the development of flying boats and seaplanes, the author points out the advantages of the single-float arrangement on the grounds that it possesses better hydrodynamic efficiency, greater longitudinal stability, is more efficient aerodynamically and lends itself for the attachment of an amphibian undercarriage. He shows the need for model tests and outlines the assumptions used for model testing. He discusses the ability of a seaplane to trim at high speeds and the question of the dynamic stability of hulls and floats during take-off. He concludes with results of investigations undertaken by the company of Short Brothers into scale effect in model tests and pressure distribution.

Torsional Vibration Device

The DVL Torsional Vibration Device (Die DVL-Drehschwingungs-Anlage), A. Stieglitz and E. Gilbert. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, No. 9, May 15, 1933, pp. 253-255, 5 figs.

A DEVICE is described which is used by the DVL in the investigation of torsional vibrations and in which the frequency, deflection and energy of the oscillations can be generated as they appear in the transmission of airplane engines. The device is constructed as two masses and furnishes an imitation of the real conditions of vibration under which a dampening device operates. The authors state that it may also be used for the testing of instruments for measuring torsional vibration at high frequencies.

Floating Ailerons

Tests of Floating Ailerons on a Bristol Fighter Aeroplane; Part I, Rolling Balance Tests on Model Wings, F. B. Bradfield and G. F. Midwood. Part II, Full Scale Tests, A. V. Stephens. (British) Aeronautical Research Committee—Reports and Memoranda No. 1501, Jan. 29, 1932 (Published May 10, 1933), 26 pp., 42 figs.

IN THE REPORTED TESTS, the port and starboard ailerons were interconnected in such a way that they had freedom to move in the same sense, while they were moved differentially by moving the control column. It was found that floating the aileron reduced, but did not entirely eliminate, the autorotation range. Aileron control with this type was better than with standard ailerons, in that the yawing moment due to the ailerons was considerably less positive. There was little increase in rolling moment, and under some conditions the rolling moment was less than for standard ailerons, being reversed in sign at very large values of alpha when there was a high rate of roll.

Spinning

Spinning Calculations on Some Typical Cases, H. B. Irving and A. S. Batson. (British) Aeronautical Research Committee—Reports and Memoranda No. 1498, Feb. 20, 1932 (Published May 10, 1933), 26 pp., 12 figs.

THE CALCULATIONS described were made in pursuance of the conception that certain combinations of aerodynamic and inertial properties of an airplane should be good from the point of view of recovery from spinning, and others bad. Of the combinations tried, the one of most interest was that of wings stable in roll (0 deg. yaw) with a large negative difference between the moments of inertia about the longitudinal and lateral axes. In addition to giving a tendency towards a dangerous spin against the controls, it has the following features: It might be worse with the center of gravity forward, might be better with floats, and worse at low altitudes, its weathercock stability was important and dihedral probably was important.

Aerodynamics

On the Moment of the Force acting on a Flat Plate placed in a Stream between two Parallel Walls, S. Tomotika. Tokio Imperial University—Aeronautical Research Institute, No. 94, Vol. 7, No. 13, March, 1933, pp. 357-393, 6 figs.

BY USING the well-known Blasius formula, the author calculates the moment of the force acting on a flat plate about its center, the plate being placed obliquely in a steady irrotational continuous stream of an incompressible perfect fluid bounded by two parallel plane walls, under the supposition that the center of the plate lies on the centerline of the channel. The method of analysis used is slightly different from that employed in the previous paper, but the results obtained are the same. Approximate ex-

pressions for the moment are given as power series of the width to length ratio. From the results, the author anticipates the tendency of the moment of the force exerted on a Rayleigh disk to vary with the ratio of its diameter to that of a tube, in which the disk is suspended obliquely in such a way that its angle of attack is equal to 45 degrees.

Acoustics

On the Acoustical Properties of Parabolic Reflectors, K. Sato and M. Sasao. Tokio Imperial University—Aeronautical Research Institute, No. 93, Vol. 7, No. 12, February, 1933, pp. 339-356, 11 figs., 4 tables.

THE PRESENT PAPER is a continuation of a preceding one dealing with the sound field of a parabolic reflector as a function of wave length, and takes up the directive properties of parabolic reflectors. The intensity of sound received is shown in polar diagrams as a function of the angle between the axis of the parabolic reflector and the ray of sound. It is shown that although these reflectors are quite different in shape, the corresponding curves for any given pitch of sound are similar to one another. It is concluded that the directive property depends only slightly on its geometrical shape if the diameter of the opening is the same. If depth and opening are given, the magnifying power of a parabolic mirror is much smaller in general than that of a conical horn, and as for the directive property, there exists no appreciable difference between them.

European Air Transport

Résumé of Commercial Information, Special Issue. Royal Aeronautical Society Journal, Vol. 37, No. 269, May, 1933, pp. 435-441. Tables only.

RETURNS are tabulated showing details of fleets of regular European air transport companies in operation up to December 31, 1932. The tables were issued by the Directorate of Civil Aviation, of the British Air Ministry. The first table covers eighteen countries and gives the number of civil aircraft on the register of the country, the operating company, number of aircraft in operation, total available pay load and average per aircraft, total horsepower of fleet, average horsepower per aircraft and average pay load per horsepower, mileage in 1932, scheduled weekly mileage and average scheduled weekly mileage per aircraft. The other table includes the flying personnel of each company and its types of aircraft and engines.

Tail Spin

The Uncontrolled Tail Spin, B. V. Korvin-Kroukovsky. Aircraft Engineering, Vol. 5, No. 51, May, 1933, pp. 105-112, 16 figs.

THIS EXPOSITION of the spin phenomenon is an American study of the principles and is interesting because of its use of new methods of attack on the problem which reach the same conclu-

sions as British investigations on different lines. The study is limited to the uncontrolled tail spin, or the spin which has reached the state of steady motion and persists in it with controls neutralized or even against controls. The author gives a general picture of what is likely to happen in a spin and applies this data to actual airplanes. He subdivides the equation of yawing into two different equations, showing the possibility of two distinct types of spin, one sideslipping, controlled by the distribution of masses, and the other, skidding, controlled by the yawing moment of the wings. He concludes that the uncontrolled spin is very improbable in the case of a high-wing monoplane. He gives expressions for the unstaggered biplane and the monoplane and adapts them to the intermediate types of biplanes of varying stagger and varying span of upper and lower wing.

Beating Flight

Beating Flight and Its Possible Solution by Oblique Attack of the Air (Le vol rame et sa solution possible par l'attaque oblique de l'air). F. Budig. L'Aéronautique, Vol. 15, No. 167, April, 1933 (L'Aéronautique Section), pp. 29-32, 5 figs.

IT IS PROPOSED to utilize the phenomenon of the oblique attack of the wind, as discovered and experimented with by the author, in a plane with beating wings where the raising and lowering of the wing relative to the wind can be obtained by transverse wind displacement. The author offers an acceptable theory of simple calculation and explains how he expects to realize horizontal flight in an airplane without a propeller. He concludes with specifications for a plane of this type which weighs 168 kilograms and flies at 72 kilometers per hour with a two-horsepower engine actuating the wings.

Trapezoidal Airfoils

The Aerodynamic Properties of a Double Trapezoidal Airfoil (Die aerodynamischen Eigenschaften von doppeltrapeziformigen Tragflügeln), J. Hueber. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, Nos. 9 and 10, May 15 and 29, 1933, pp. 249-251 and 269-272, 9 figs.

IN THE FIRST installment of the article, the accurate calculation of lift, angle of incidence and distribution of resistance on trapezoidal wings is given in a short bibliography. The second part compares the lift and drag coefficients for the whole wing with those for elliptical wings, which leads to the set-up of a general transformation formula for arbitrary aspect and trapezoidal ratios. The last part contains a comparison with the results obtained by the Amstutz approximate method, which shows partially a rather good agreement with the accurate calculations. The results of the reported investigation were obtained in connection with a wider investigation.

The Vought Model V-80

"CORSAIR" FIGHTER



● Flight tests have just been completed on a new single-seater "Corsair" fighter, produced by the Chance Vought Corp. of Hartford, Conn., and having high performance, unusually long cruising range and maximum fighting power.

The airplane, known as Model V-80, has been developed to meet the conditions encountered in many foreign countries having relatively small air forces and few airdromes, which are often widely scattered and difficult of access by land. For reasons of economy, it is highly desirable to keep the number of types of aircraft at a minimum, and the principal offensive aircraft in these air forces, therefore, are single-seaters and two-seaters, which between them fulfill the functions of pursuit, observation, bombing and attack aircraft. Moreover, because of the scattered and inaccessible location of airdromes, transportation of spares becomes a difficult problem, and interchangeability of parts is important so that the quantity of spares may be kept at a minimum. Still another controlling factor, also due to the scarcity

of airdromes and the unfavorable terrain, is the necessity for long cruising range, to insure maximum mobility of operating units.

For those air services already equipped with two-seater Corsairs (and this includes the governments of eight foreign countries), the single-seater V-80 fulfills these requirements. It is a direct development of the two-seater Corsair, using the same skeleton fuselage, wings and tail, landing gear and many other items of equipment, all of which are interchangeable between the two types. It carries four fixed machine guns and two bomb racks, so that in emergency it can perform attack or bombardment functions in addition to pursuit. It has a fuel capacity of 173 gallons, sufficient for a cruising range of more than 800 miles.

The power plant is the Pratt & Whitney TIC-1 Hornet, rated at 700 h.p. at 2,000 r.p.m. at sea level. It is cowed with an anti-drag ring and provided with a Hamilton Standard metal propeller and Eclipse electric starter.

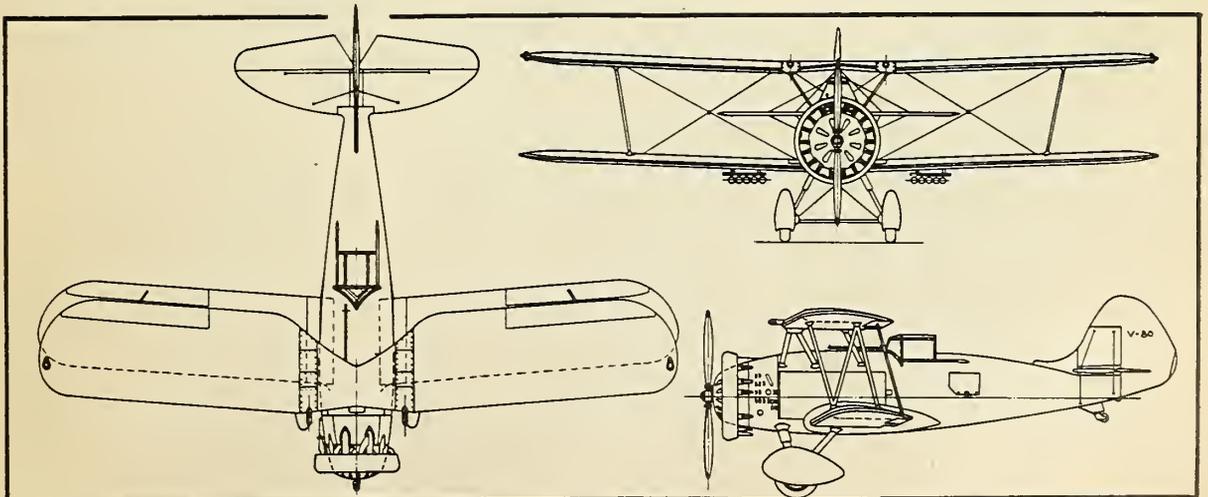
The V-80 is equipped with a transpar-

ent cabin for the cockpit, providing maximum speed and insuring comfort for the pilot without impairing his vision. The four guns all fire directly forward, two being mounted in the upper center section and two in the fuselage, synchronized to fire through the propeller circle. The guns are electrically operated, and selector switches are provided so the pilot can cause any or all guns to fire when the control stick trigger is pressed. Standard A-3 bomb racks are carried under the lower wings, with controls in the pilot's cockpit. As in the standard two-seater Corsair, provision is made for ready interchange of wheel-type landing gear with single-float seaplane gear.

190 m.p.h. during flight tests

In its trials at Rentschler Field, the V-80, equipped as a landplane with full military load, including a normal fuel load of 130 gallons, showed a top speed of 190 miles an hour.

The V-80 has a wing span of 36 feet; length, 27 feet 2 inches, and height, 10 feet 8 inches as a landplane.



Three-view scale outline drawings of the Vought Model V-80, single-seater "Corsair" fighter with full military armament

NEW EQUIPMENT and METHODS

The De Beeson Automatic Control

• THE DE BEESON Automatic Control with which Frank Hawks' Northrop monoplane, the Texaco *Sky Chief*, was equipped in his recent non-stop flight from Los Angeles to New York, breaking his former record, is for the automatic control of direction and stability of flight. Its main purpose, of course, is to relieve the human pilot of these routine duties by means of an automatic control of more than human sensitivity with mechanical precision independent of visibility.

The following brief description of the device was supplied by Dr. M. Sutter, Ph. C.:

The device is small, compact and simple in construction, weighing approximately 35 pounds complete. Its installation is simple, requiring no plane alterations. The human pilot can instantly connect or disconnect the robot in its operating relationship with the plane, the robot being at all times in readiness to assume control and continue its duties without further attention from the human pilot. It is not adversely affected by violent maneuvers or vibration.

The unit controlling stability is an original non-revolving poise-device so balanced that the slightest deviation from the longitudinal or lateral position brings instant adequate response without lag or over-control. Its construction is rugged and dependable and its life practically indefinite.

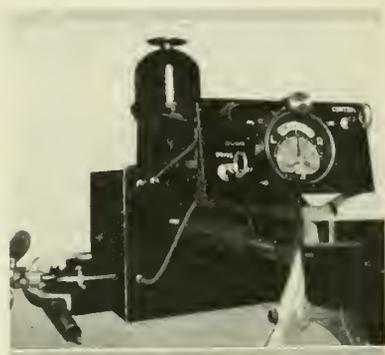
The unit governing directional control is an especially designed compass-device capable of steering a plane within one degree of its set course. It is not subject to oscillation in turns, its lag is slight and it will recover from violent maneuvers in 15 seconds. It is not affected by dip, is less affected by local attraction than the ordinary compass and can be compensated in five minutes.

The power-mechanism can be driven either by motor or by a small propeller operating in the slipstream of the plane. There are no fast-moving parts. It operates a low-pressure vacuum system, merely acting as a mechanical power step-up connection between the governing units and the plane controls. Mechanisms of this type have been known to last in use 50 years.

The unit governing direction, the unit governing stability, and the power-mechanism are separate units and can be separately installed. The operating connection of the robot with the plane is simplicity itself, consisting merely of an attachment to the control-stick. This simple operation, however, instantly transforms the plane and robot into one inter-working operating unit functioning

as one complete whole as a flying ship without human intervention. The robot controls the plane in any position the plane may be in. It will automatically execute a perfect bank according to the speed and amount of rudder given.

The illustration below shows the automatic control mechanism which guided Lieut. Commander Hawk's Texaco *Sky-Chief* for 1,500 miles of its recent non-stop transcontinental record flight. The robot is located in the fuselage, forward of the cockpit, and is operated from the cockpit by a control unit attached to the stick. The robot occupies less than a cubic foot of space.



The De Beeson robot is a compact unit

Airport Traffic Control Projector

• ENGINEERS of the Westinghouse Electric and Manufacturing Co. have developed a new "gun" for traffic control at airports that are not equipped to radio directly to pilots. The device is a searchlight, 8½ inches in diameter, 16 inches long and weighing only seven pounds, but it has a maximum beam candlepower of 350,000. Its small size and light weight permit ease of operation and minimum fatigue after an extended period of traffic operation.

The Westinghouse unit is equipped with two pistol grip handles and is carefully balanced to aid the operator in aiming at his target accurately and steadily. Like a gun, the projector must be aimed carefully, since it "shoots" a beam of light only 12 inches wide. The beam, however, although narrow, is so powerful that it is normally visible for 10 miles in the daytime and 15 miles at night. Signals are readily discernible to the pilot of any aircraft that is visible to the airport's traffic director.

The directing beam may be made white, red or green by pulling the front trigger of the searchlight. As the pilot of a plane is circling the airport, the traffic manager "shoots" him with the

beam. If it is red, he stays up; if green, he comes in. The same signals are used for taking off. The white beam is used by the traffic director to "spot" objects on the ground for the pilots landing at night.

In "shooting" airplanes, the operator aims at them by means of a sighting tube mounted on top of the projector. This sighting tube is equipped with a peep-sight at the rear and cross hairs at the front. The field of view is such that the operator can readily aim the unit and at the same time can see that no other aircraft, other than the one to which he is signaling, is in the limits of his signal.

Airports now using Westinghouse units include the Cleveland (Ohio) Airport; the Port of Newark, N. J., and the City-County Airport at Pittsburgh, Pa.

United Air Lines Develops Operations Aids

• BY THE DESIGNING of special vacuum test equipment, United Air Lines is now able to test the gasoline line system in any plane. The fuel line is hooked up to the tester, and a vacuum of 20 pounds of mercury is put on the lines, which must hold this reading for 10 minutes with a minimum drop of one-half inch.

A special device to indicate the direction and velocity of winds at airports for the benefit of radio dispatchers at United Air Lines ground stations has been developed by engineers of the company. It consists of a dial, with small white lights at points indicating north, northeast, east, southeast, south, southwest, west and northwest. The device is connected to a wind vane, which makes contacts, turning on the proper light to show the direction of the wind. In addition, there is a red light in the center of the dial which is connected to an anemometer. The red light flashes on and off, and turns on as many times during one minute as the number of miles per hour the wind is blowing. By glancing at the dial, the dispatcher can obtain this information and promptly relay it to pilots coming in to land.

Replacement Cylinders For Szekely Engines

• MOLLER-WALTON, of New Canaan, Conn., has developed a drop-forged steel replacement cylinder for Szekely engines. These cylinders are not reinforced cast iron, but 1050 S. A. E. steel drop forgings, machined all over. Weighing 14 ounces less than factory cylinders, their tensile strength of 110,000 pounds is nearly three times greater. Not being subject to crystallization from vibration, as is cast iron, they are guaranteed against cracking for 1,000 hours.

Pre-Setting Bi-Post Lamp Socket Device

• A BI-POST lamp socket pre-setting device which makes it possible accurately to locate the socket with respect to the optical systems of beacons, projectors, floodlights, etc., and thereby promote perfect lamp focus, has been developed by the Nela Park Engineering Department of General Electric Co., Cleveland, Ohio.

The pre-setting device provides a small knob on the end of a pointer, accurately located as to light center length and axial alignment. By inserting the device in a socket and then placing the knob at the focal point of the optical system as determined by sighting, the socket can be properly set.

This method is designed to be more accurate than sighting at a large filament, and also obviates the difficulty introduced by the wide channel structure. The device is for use with lamps of four-inch light center length.

Nuts That Snap Into Position

• THE SNAP-NUT, made at Bridgeport, Conn., by Industrial Engineering, is an ingenious device permitting the use of nuts in the attachment of skin, upholstery, trim, strut fairings, wing covering, brackets, flooring and similar items, wherever the nut can not be reached and held while inserting the screw. To attach the Snap-Nut, only a drilled hole is necessary, and the proper size nut of steel or dural is snapped on. The flared hole maintains the location, and the strap end takes torque upon screw insertion.

The thickness of the snap-nut is .014 inch, suitable in any assembly for thin sheet attachment. One type, where the screw head may be exposed; allows use of either a round or mushroom head. A second type permits the use of flat-head screws for flush mounting of skin on hulls, pontoons and wing covering by counter-punching.

Ice Shields for Airplane Propellers

• PROTECTION against ice is provided in a shield for airplane propellers developed by Dr. W. C. Geer and Dr. William Scott of the physics department at Cornell University. The device is the result of several years' research on the problem of ice protection for aircraft, and was developed with the aid of the Daniel Guggenheim Fund for the Promotion of Aeronautics. The shield is mushroom shape and about the diameter of the propeller hub, which it covers. Projecting slightly in advance of the propeller, the shield serves as a surface on which ice collects instead of on the

propeller hub and blades. The device is reported to have been used successfully in air mail flights.

Airport Localizer Beam With Movable Antenna

• HOW planes can be guided over cloud-obscured airports by means of a directional radio apparatus that sends up a well defined path of signals from the airports to pilots flying above clouds as far away as 15 miles, has been revealed by United Air Lines engineers after completing tests along its New York-Chicago-Pacific Coast mail, passenger and express airway. Known as the "airport localizer beam," the radio signals are broadcast over a directional antenna that can be aimed to shoot the signals toward a pilot flying at any point within a 15-mile radius of the airport.

The localizer beam is coordinated with the Department of Commerce directive radio beacon established along mail-passenger airways to identify by special signals the course of the air routes from city to city. As the pilot, flying above clouds, approaches his destination, he communicates with the dispatcher at the airport by radio telephone and advises his position. The dispatcher immediately locates the position on his chart, turns the movable antenna of the localizer beam in the proper direction and shoots a steady stream of signals at the pilot. When the pilot hears the localizer signals in his earphones, he follows them until he emerges from the clouds directly over the airport. If he strays from the course, the signals immediately change to warn him of his deviation.

Acroplane for Student Training

• AVIATION SCHOOLS find the Eyerly Acroplane of value for the primary training of students and for those wishing to learn acrobatics. After "flying" this device, students acquire the feel of an airplane quickly. It teaches them to hold the ship in level flight, familiarizes them with control movements, and they become accustomed to flying the ship in varied positions. The student practices on the machine until he becomes used to the maneuvers of the plane when stunting. Both beginners and advanced students know just what to expect when they go into the air for regular training after first having mastered the Acroplane. It is made in two models, the picture showing the 1933 model.

The steel frame allows the fuselage to swing through a complete 360-degree loop. The part enclosing the motor is connected, by tapered roller bearings, to the upright frame, and the fuselage, fitted with the control surfaces, revolves



The Acroplane in a vertical "dive"

360 degrees, so that rolls are completed and upside-down positions possible.

This trainer is used for simulating upside-down flying. Even veteran fliers, never having flown in this position in the air, enjoy practicing inverted flights. After practice in the Acroplane, the pilot becomes used to hanging by his belt, head down.

The Acroplane assists in giving timid folk that necessary confidence in flying, for by means of it they can "fly" and yet "keep one foot on the ground."

The Acroplane has a propeller swung by a 15-horsepower, two- or three-phase motor and can be dismantled and shipped in box or baggage cars. It is also mounted on its own four-wheeled trailer and can be drawn by car or truck. Net weight is 2,100 pounds.

Ground space required without fence is 4 feet 10 inches by 11 feet 6 inches; complete with fence, 18 feet by 18 feet; height overall, 18 feet 2½ inches. One man can operate it without assistance.

An Acroplane is now in use at Captain Sansom's Air College, Interstate Airways, Inc., Hartford, Conn.

Radio Telephone Testing Device

• UNITED AIR LINES has announced the development of a device for checking microphones and receivers, both pilot and ground station radio telephone equipment. The device consists of a miniature radio transmitter that broadcasts a set signal, and a sensitive meter that records the exact volume as received by the equipment being tested. By placing the pilot's headphones or microphone in the apparatus and turning a switch, the amplitude of the signals in the phones is indicated.

The Seversky SEV-3 high-speed amphibion



• Flight tests have been made recently of the SEV-3 amphibion built by the Seversky Aircraft Corporation. The SEV-3 is a low-wing twin-float amphibion with wheels housed within the floats, an arrangement which results in an amphibion of practically seaplane fineness and with similar performance expectations except for the effect of such additional weight as that of the wheels, with their structure and necessary attachments. The SEV-3 is of an all-metal design accommodating three persons in two tandem-disposed cockpits.

The wing construction is of cellular skin stressed type with smooth outer covering. In addition, the top side is reinforced by corrugated sheets with corrugations running along the span, while the bottom skin is stiffened by the use of closed channel type longitudinals extending the length of the span. The structure is made by first finishing the top and bottom skin and then assembling them into the wing.

In converting the design from a commercial to a military type this type of structure is well adapted to changes in strength requirements, since lighter load factors may be achieved by corresponding changes in the gauges of metal employed. Another advantage of the cellular wing structure is its great degree of invulnerability to machine gun fire. The multiplicity of load-carrying members constitutes an important safeguard for military operations, and results in a wing of great torsional rigidity.



The fuselage is of a monocoque type. It has a seating capacity for three, but the present plane could be redesigned to seat five people. The front main bulkhead is connected to the corresponding webs of each box section of the wing. At the juncture of wing and fuselage there are five points of attachment at each side, precluding the necessity of special reinforcement for concentrated loads, the stresses being distributed gradually along the skin. To insure rigidity and minimize vibration, special care has been exercised in the tail surface design.

The fin is built integral with the fuselage structure and the adjustable horizontal stabilizer is secured at four points of attachment, in order to distribute stresses over a large area of skin.

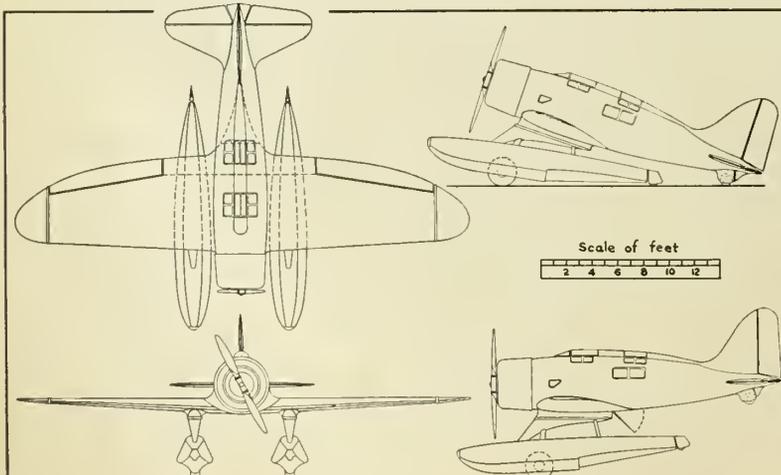
The engine mount is constructed of welded steel to insure maximum accessibility to the power plant installation.

Rubber vibration absorbers are used at fuselage attachment points.

Floats and floatation gear are of novel and original design. Contrary to previous practice, the wheel wells do not have to be closed to facilitate take-off from the water, as the float lines are so designed as to assure smooth and undisturbed water flow at the take-off and alighting. Specially-designed water rudders are provided, assuring full control and high maneuverability in taxiing on water.

In military emergencies planes of this type could alight on the sea alongside of vessels, or land on carrier decks, using existing landing methods. In case of emergency, when the plane cannot land on a carrier, it could land with wheels retracted on the ski-like keels of its floats which would reduce the landing roll to a short slide. This latter feature is also of importance since it adds to the safety of flying in case of a forced landing. Most forced landings occur unexpectedly, leaving little choice of landing place and are, therefore, invariably made in small spaces. In the case of the SEV-3, after the initial shock had been absorbed by the wheels, the relief valve in the hydraulic shock absorbers could be opened and the wheels would retract in the floats, the ski portion of the floats acting as an effective braking force. Due to their length, the floats could negotiate ditches, where the average plane would overturn. The length of the float also permits sudden application of brakes with full force.

Controls are equipped with ball bearings and are aerodynamically so arranged that their operation requires minimum physical effort. They are arranged so that it is not necessary for the pilot to remain in a constant position, allowing full freedom to his limbs, thus adding to his comfort through long hours of flying.



The SEV-3 is designed for the installation of a 420 h.p. Wright Whirlwind J-6-9E, or a 700 h.p. Wright Cyclone F-2, and as an amphibion its top speed with 700 h.p. is expected to be 260 miles per hour. The plane is so designed that it can be converted into a straight land plane with a top speed of 275 miles per hour, and with a retractable landing gear, 290 miles an hour.

Aside from its speed, this amphibion has many advantages in its operation through the ease with which it can alight upon water, land, ice, or snow. Its convertible cockpits possess the comforts of the closed cabin, yet it can be instantaneously converted into open cockpits. This feature, coupled with the fact that the seats are adjustable, provides extensive visibility in the landing and taking-off, as well as while taxiing on the ground and water. An automatic device enables the pilot to drop the anchor from the starboard float without leaving the cockpit.

The plane is provided with an air brake located under the wing, between the ailerons. By its use the speed of the

ship can be lowered by 15 m.p.h. and the landing roll reduced by about 50%. This brake deflects the air flow above the wing, reduces the negative pressure on the stabilizer and thus compensates for the shifting of the center of pressure on the main wing.

The ship is coated with an attractive bronze lacquer, a new protective finish developed by Major Seversky in cooperation with the Murphy Varnish Co.

Specifications

	Land Plane		Amphibion	
	Cyclone	F-2	Cyclone	Whirlwind
Span	36' 0"	36' 0"	36' 0"	36' 0"
Length	25' 8"	25' 8"	25' 8"	25' 8"
Height	9' 9"	9' 9"	9' 9"	9' 9"
Wing area (sq. ft.)....	208.3	208.3	208.3	208.3
Weight empty (lbs.)....	2,600	2,800	2,800	2,390
Useful load (lbs.)....	1,000	800	860	860
Gross weight (lbs.)....	3,600	3,600	3,600	3,250
Maximum horsepower ...	700	700	420	420
Wing loading (lbs./HP.)	17.25	17.25	15.6	15.6
Power loading (lbs./sq. ft.)	5.15	5.15	7.74	7.74
Top speed, sea level (m.p.h.)	255	240	190	190
Top speed at 15,000 ft. (m.p.h.)	275	260	...	...
Landing speed (m.p.h.)..	65	68	60	60
Rate of climb (ft./min.)..	2,750	2,475	1,640	1,640
Service ceiling (ft.)....	32,000	28,800	20,200	20,200
Absolute ceiling (ft.)....	35,000	31,500	21,800	21,800

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N.W., Washington, D. C.

Aerial bomb. Grover C. Anderson, Gateway, Mont. (1,903,348)

Helicopter device. Walter R. Cambridge, Fort Bidwell, Calif. (1,903,440)

Flight indicator. Kenneth E. Gath, Harrisburg, Pa. (1,903,449)

Parachute. Henry Hojda, Moravska-Ostrava, Czechoslovakia. (1,903,563)

Airplane propeller. John P. Landrum, Birmingham, Ala. (1,903,628)

Propeller balance. Nelson V. Johnson, Philadelphia, Pa. (1,903,817)

Wing-lift system for aircraft. Bernhard G. Jutting, Jersey City, N. J. (1,903,818)

Aerodynamic surface. Victor Lougheed, Washington, D. C. (1,903,823)

Piloting system. John A. Willoughby, Cambridge, Mass. (1,903,846)

Aerial navigator. Walter A. Meador, Gallatin, Tenn. (1,903,911)

Propulsion of aircraft. Archibald Hall-Brown, London, England. (1,904,134)

Propeller. Spencer Heath, Elkridge, Md., assignor to American Propeller Co., Baltimore, Md. (1,904,733)

Rotary wing aircraft propeller. Charles R. Ohnsorg, New York, N. Y. (1,904,746)

Automatic airplane and dirigible control apparatus. Nicola C. Plutino, Welland, Ont., Canada. (1,904,801)

Flying machine. Tylor McDaniel, Washington, D. C., assignor to McDaniel Glider, Inc. (1,905,298)

Aeronautical propeller. Werner J. Blanchard, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,905,891)

Aviation engine. Louis Chevrolet, Baltimore, Md., and Russell J. Parrish, Indianapolis, Ind., assignors to Glenn L. Martin Co. (1,906,045)

Parachute. James F. Prendergast, Leicester, and Erland Johnson, Geneseo, N. Y. (1,906,091)

Controls for fluid-pressure-operated wheel-brakes. William L. Avery, London, England, assignor to India Rubber, Gutta Percha & Telegraph Works Co., Ltd. (1,906,242)

Apparatus for cooling internal-combustion engines. George A. Page, Jr., Freeport, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,906,404)

Aviator training or amusement device. Alvin Bisch, Chicago, Ill. (1,906,443)

Gun-mounting for use on aircraft. Bonner W. A. Dickson, Little Bridgen, Bexley, England, assignor to Vickers-Armstrong, Ltd., Westminster, England. (1,906,451)

Airway system. John P. Buckley, Washington, D. C. (1,906,736)

Aircraft, especially amphibian. Igor Sikorsky, College Point, N. Y., assignor to Sikorsky Aviation Corp. (1,906,823)

Sheet metal airplane structure. Earl J. W. Ragsdale, Norristown, Pa., assignor to Edward G. Budd Mfg. Co., Philadelphia, Pa. (1,907,002)

Variable-pitch propeller. Elmer A. Sperry, Brooklyn, N. Y., assignor to Sperry Development Co. (1,907,014)

Airplane passenger's safety belt. Raymond E. Dowd, Chicago, Ill., and Franklin A. Thompson, Ridgewood, N. J., assignors to Russell Mfg. Co., Middletown, Conn. (1,907,098)

Stabilizer control. Robert S. Van Atta, Rochester, N. Y. (1,907,374)

Airplane. David E. Van Vactor, Evanston, Ill. (1,907,394)

Airplane. Harry A. Douglas, Bronson, Mich. (1,907,423)

Airplane construction. John Squires, Hagerstown, Md. (1,907,454)

Indicating system for aircraft. Ernst F. W. Alexanderson, Schenectady, N. Y., assignor to General Electric Co. (1,907,471)

Variable-pitch propeller. Roland Chilton, Keyport, N. J., assignor to Uppercu Corp. (1,907,504)

Automatic landing device for airplanes. Earle C. Morse, New York, N. Y. (1,907,652)

Aircraft with rotative blades or wings. Harold F. Pitcairn, Bryn Athyn, Pa., assignor to Autogiro Co. (1,908,177)

Rotative-winged aircraft. Heraclio Alfaro, Philadelphia, Pa., assignor to Autogiro Co. (1,908,212)

Parachute. William F. Herrick, Jackson Heights, N. Y. (1,908,243)

Method of and apparatus for controlling aircraft. Jerome R. Cox, Hartford, Conn., assignor to Bendix Aviation Corp. (1,908,408)

Airplane shutter. Rex B. Beisel, Hempstead, and George A. Page, Jr., Freeport, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,908,757)

Propeller mounting. Werner J. Blanchard, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,908,814)

Engine cowling. Roland Chilton, Ridgewood, N. J., assignor to Wright Aeronautical Corp. (1,908,820)

Variable-pitch propeller. John Edman, Minneapolis, Minn. (1,908,893)

Speed controls for aircraft. Fred W. Findley, Longview, Wash. (1,908,894)

Parachute for airplanes. Milton J. Nouselak, Bingham Canyon, Utah. (1,909,067)

Parachute-harness. Edward L. Hoffman, Dayton, Ohio. (1,909,176)

Airplane wing. Victor Lougheed, Washington, D. C. (1,909,186)

Helicopter. Maitland B. Bleeker, Phoebus, Va. (1,909,450)

Stabilizing mechanism for airplanes. William C. Jenkins, Dongan Hills, N. Y. (1,909,682)

Helicopter aircraft. Bruno Nagler and

Raoul Hafner, Vienna, Austria. (1,909,845)

Seaplane. Raymond J. Norton, Washington, D. C., assignor to Bendix Aviation Corp. (1,906,712)

Navigation calculator. Charles H. Colvin, Brooklyn, N. Y., assignor to Pioneer Instrument Co. (1,910,093)

Safety device for aircraft. Sabinus Christensen, Atlantic City, N. J. (1,910,379)

Amphibian aircraft. Harold Bolas and Rupert G. Crouch, Bridgeport, Conn. (1,910,423)

Method of adjusting radio beacon courses. Harry Diamond, Washington, D. C., dedicated to the public. (1,910,427)

Airplane dolly. William F. Hohorst, Scott Field, Belleville, Ill. (1,910,436)

Aircraft with rotative sustaining blades. Juan de la Cierva, Madrid, Spain, assignor to Autogiro Co. (1,910,520)

Airplane folding wing. Winfield B. Kinner, Glendale, Calif. (1,910,611)

Air screw. Cecil E. McGuire, Douglas, Ariz. (1,910,622)

Airplane airfoil wing. Jay H. Montgomery, San Gabriel, Calif., assignor to Vortex Wing Corp., Los Angeles, Calif. (1,910,626)

Training apparatus for flying machine pilots. Harry G. Traver, Beaver Falls, Pa. (1,910,655)

Aircraft. James S. Smyser, Boston, Mass. (1,911,041)

Automatic steering for dirigible craft. Elmer A. Sperry, Jr., Brooklyn, N. Y., and Frederick S. Hodgman, Glen Rock, N. J., assignors to Sperry Gyroscopic Co. (1,911,168)

Air navigation apparatus. Arthur M. Trogner, East Orange, N. J., assignor to Wired Radio, Inc., New York, N. Y. (1,911,169)

Aircraft with rotative sustaining blades. Juan de la Cierva, assignor to Autogiro Co. (1,911,183)

Means for receiving mail and other matter on airplanes while in motion. Harry F. Stillwell, San Antonio, Tex. (1,911,248)

Propeller. Thomas R. MacMechen, New York, N. Y. (1,911,376)

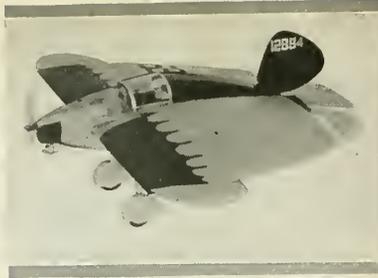
Tail-skid and rudder for airplanes. John E. Younger, Berkeley, Calif., assignor of one-half to Capelis Safety Airplane Corp., El Cerrito, Calif. (1,911,416)

Aircraft propulsion. William Harper, Jr., Port Washington, N. Y., assignor to Supermarine Systems, Inc., New York, N. Y. (1,911,567)

Airplane. Grover Loening, Mill Neck, N. Y., assignor to Grover Loening Aircraft Co., Garden City, N. Y. (1,911,577)

Helicopter type aircraft. Herman Klatt, Pueblo, Colo. (1,911,695)

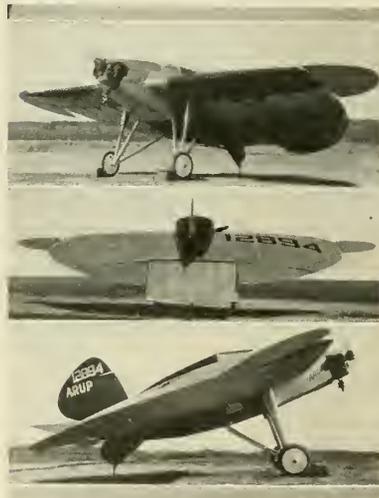
Single control with reflex action for helicopter type flying apparatus. Paul P. Pescara, Barcelona, Spain. (1,912,354)



The Arup Flying Wing

• On May 28th a new type of aircraft was publicly demonstrated before a crowd of several thousand spectators at the Bendix Municipal Airport, South Bend, Ind. This new plane, the "Arup" model S-35, invented by Dr. C. L. Snyder and built under the direction of R. J. Hoffman, was flight tested by Glenn Doolittle.

The pilot advises that the ship, although powered by a Continental A40, which develops about 37 h.p., actually handles like a big job. It takes off promptly, climbs rapidly and is a real revelation in landing since it comes in after the manner of an autogiro. The fuselage, which is, of course, rudimentary, is of welded steel tubing. Wings are fabric-covered wood throughout and the thickness at the root is two feet for a span of only 19 feet, but without ailerons. It seems to be one of the first strictly flying wing jobs which has been produced without excessive sweepback. The center section at the trailing edge is used for an elevator, while the two outer sections at the rear, are adjustable as stabilizer



Views of the Snyder "Arup"

elements. The wing section is double cambered with a slight inverse curve near the trailing edge.

There is an open gap in the fuselage lines forward of the pilot; this is to increase visibility and apparently has no detrimental effect on the speed of the machine. Entrance and exit to the cockpit is through a sliding door under the wing, on the right hand side.

The Arup is the result of seven years of study and experimentation by Dr. Snyder with the principle of the flying wing. There were cardboard models of the flying wing at first, small wooden models followed, larger wooden models were constructed next, and then wind tunnel tests were begun.

A year ago Dr. Snyder's ideas of a flying wing culminated in the exhibition and flight of the Arup glider. Several months later the glider was motored and flew successfully.

Engineer Hoffman was employed as the aeronautical consultant to supervise the construction of the first Arup. Eight and one-half weeks later the first model of the Arup was completed.

Pilot Doolittle, who also had flown the Arup glider and the motored glider, began to put the craft through its paces. For days, he felt out the Arup on the ground, soared into the air, shot across the field, zoomed upward at an amazing angle, circled the port several times and landed slowly and gently.

Some fifty such test flights followed before the Arup was demonstrated publicly. Actual flight tests showed that the Arup has a top-speed of 97 miles per hour as compared with 73 miles per hour for a conventional type of plane of the same weight, area and power plant, a landing speed of 23 miles per hour as compared with the conventional ship's 35 miles per hour. The Arup's stall glide, height to distance, is one to three as compared with one to six for the standard ship.

Plans have been made for a bigger and better Arup, a flying wing with a span of 35 feet, an area of 720 square feet, and having a total flying weight of 13,000 pounds. It will have a top-speed of 220 miles per hour, and a landing speed of about 49 miles per hour. A still larger Arup is being planned; it will have an 80-foot wing span, an area of 3,700 square feet and a total weight of 67,000 pounds.

Specifications

Wing span	19 feet
Length	16 feet
Wing area	211 square feet
Aspect ratio	1 to 1.72
Total weight	780 pounds
Wing loading	3.68 pounds per sq. ft.
Power loading	21 pounds per b.h.p.
Top speed	97.3 miles per hour
Landing speed	23 miles per hour

NEWS OF THE SCHOOLS

Penn School Opens New Section

A NEW DIVISION has been established by the Penn School of Aviation at the Allegheny County Municipal Airport, Pittsburgh, Pa. According to F. R. Crawford, managing director of the school, the response to the opening of this new division has resulted in the enrolment of eighteen new flying students.

In addition to regular flying courses, the school has added to its curriculum a special autogiro pilot's course. This course is primarily for those already holding pilots' licenses and comprises ten hours of instruction on a Kellett K-2. Instruction will also be given to those wishing to become autogiro pilots only.

A group of thirteen University of Pittsburgh aeronautical engineering students are taking a summer course at the school. The curriculum is especially designed to familiarize them with the business phases of aviation and includes lectures by Pennsylvania Airlines department heads in addition to several days spent at the Pittsburgh-Butler Airport, an approved overhaul and repair station, and several days at Pennsylvania Airlines Cleveland terminal, where the airline's maintenance department is centered.

Virginia School Adds to Equipment

THE MT. VERNON Airways, Inc., owners and operators of the Alexandria (Va.) Airport, the Mt. Vernon School of Aeronautics and the Washington Aero Brokerage Service, have announced their appointment as dealers for the Taylor Aircraft Co. in Delaware, Maryland, the District of Columbia and the greater part of Virginia. The Taylor Cub light airplane has been added to the equipment of the school for training, permitting a reduction in rates. The enrolment in the school has been increased by over twenty new students since the end of April.

Casey Jones School Makes Essay Awards

JUDGES in the scholarship contest conducted by the Casey Jones School of Aeronautics, Newark, N. J., announced last month that the first prize, a sixteen-week summer course in the school, has been awarded to Cuthbert Pratt, a student in the Lyndhurst (N. J.) High School. Four additional prizes of an airplane flight over New York and Newark were awarded to Albert Delvers, of the New Brunswick High School; Percy Gilbert, of the Roselle Park High School; James O'Neil, of Jersey City, and Robert Smith, of the Summit High School.

The contest was open to any boy residing in New Jersey and between the ages of 16 and 21 for the best essay on the subject, "The Future of Newark Airport as the Metropolitan Air Center." The judges included Manager Richard Aldsworth, of Newark Airport; E. B.

Berlinrutt, aviation editor of the *Newark Sunday Call*; S. Van Dyne, aviation editor of the *Newark Evening News*; Irving Polk, director of the Bamberger Aero Club, and Casey Jones, president of the Casey Jones School of Aeronautics.

Dormitory Built for Dallas Students

A NEW DORMITORY has been constructed at Love Field, Dallas, Tex., to house students of the Dallas Aviation School, which is located at the field. This expansion, which gives total dormitory space for about seventy-six students, was made necessary by a capacity enrolment. The building adjoins one of the school's hangars. C. E. Harman is general manager of the school.

Alabama School Established

EUGENE J. SCHWAB has opened a school at Dothan, Ala., where a municipal field was recently dedicated. Mr. Schwab conducted schools at Mobile and Montgomery, Ala., before entering the new field at Dothan.

Roy Hunt Opens Flying School

A FLYING SCHOOL has been established in connection with the Oklahoma Aviation Service, Inc., Oklahoma City, by Roy Hunt, speed pilot. Mr. Hunt has evolved a plan to make material reductions in the cost of ground school work; to enable potential pilots to obtain this phase of flying. Both equipment from the flying company and Mr. Hunt's personal airplanes will be utilized for flight instruction, all of which will be supervised by him.

Parks Publishes School Magazine

A MONTHLY MAGAZINE, "Parks Air News," is being published by Parks Air College, East St. Louis, Ill. The publication includes general news of the aeronautical industry, items relating to the school and its personnel and activities of the alumni. One page of each issue contains a pictorial review of aeronautical events.

Boeing Summer Quarter Begins July 6

THE OPENING of the summer quarter at the Boeing School of Aeronautics, Oakland, Calif., has been set for July 6, T. Lee, Jr., general manager, has announced. Enrolment in master mechanic and master pilot ground courses is reported as heavy.

School Is Formed at Houston

A FLYING SCHOOL has been established at the Houston, Tex., municipal airport by C. G. Harrison and Victor Martin. Various types of flying and ground instruction will be offered. Equipment includes a Kinner Fleet training plane.

Roosevelt School Summer Courses

ROOSEVELT Aviation School, Inc., of New York, N. Y., and Mineola, L. I., N. Y., has announced mechanics' summer courses at reduced rates. The courses cover engines, airplanes and welding. A one-year master mechanics' course will be offered at a special rate for those who enroll by July 10. Enrolments for the above courses are taken on Mondays until July 10, which is the final date for registration.

Boeing Expands Aircraft Metal Course

SHEET METAL shop equipment belonging to the Boeing School of Aeronautics, Oakland Airport, Calif., has been expanded, and the metal fabrication course has been broadened. Many pieces of modern equipment have recently been installed, and the study of metals fabrication is receiving added attention in the master mechanic course. When the course was first started, metals fabrication was allotted thirty-six hours of study. Now 180 hours are devoted to the course, with an additional 144 hours for the student majoring in the subject.

A complete cadmium plating plant has been installed at the school for instruction purposes. It was designed and built by the school, under the direction of the Udylyte Co.

Amphibion Flight Training at Ryan

RYAN SCHOOL of Aeronautics at San Diego, Calif., has announced the addition of amphibion training to the flight curriculum. All Ryan students who enroll for private and limited commercial courses will have the option of two hours of amphibion instruction, and all Ryan transport students will have the option of ten hours of amphibion instruction as a regular part of their flight training. A special seaplane course is also listed in the new Ryan tuition schedule for licensed pilots who wish to qualify for this type of commercial activity.

Extensive tuition reductions through the entire list of Government-approved courses at the school have been announced by Earl D. Prudden, vice president. While part of the reduction was made possible by the new Department of Commerce regulations, which allow shorter training periods at Government-approved schools, it is stated that much of the cut in prices is the result of increased operating efficiencies and student enrolments, which resulted from the school's move to its own new buildings at Lindbergh Field a few months ago. Many of the courses are now available for less than half the price that it was necessary to charge for similar instruction three years ago.

THE AIR SERVICES

Curtiss A-12 Army Attack Planes

FORTY-SIX new, fast, all-metal, two-seat attack monoplanes, known as the Curtiss A-12, are being built for the Army Air Corps by Curtiss Aeroplane & Motor Co., Buffalo, N. Y. The Curtiss A-12 is equipped with five machine guns and carries a bomb under the fuselage, at the same time having speed considerably in excess of former attack airplanes. It is built entirely of metal, including the covering of the wings and fuselage. Slots are built in the leading edge and flaps on the trailing edge of the wing in order to provide a relatively low landing speed.

The new attack monoplane is similar in appearance to the Curtiss A-8, also known as the "Shrike," except for the power plant. The engine which powers the A-12 is a nine-cylinder 700-horsepower R-1820F Wright Cyclone, which weighs only 1.22 pounds per horsepower. This engine includes innovations such as a down-draft carburetor, spark-plug coolers and an 11-inch supercharger impeller. The Shrike was equipped with a Prestone-cooled 12-cylinder 650-horsepower Curtiss Conqueror V engine.

Navy Gives Contracts to Switlik

THE NAVY has accepted the Switlik quick-attachable parachute as standard equipment for all Navy pilots. Capable of being used either as a back-pack or seat-pack, the parachute serves as part of the cockpit upholstery, the pilot wearing the harness only and attaching the parachute when entering the ship. One Naval order calls for twenty-five white silk quick-attachable Switlik back packs in the twenty-four-foot size; another involves 450 parachutes to be made at the Naval Aircraft Factory in Philadelphia, Pa., under a patent licensing agreement with the Government.

A third Navy contract has been awarded to the Switlik company for the installation of twenty-six Switlik chair packs in two Ford transport planes. Six more of these packs have been installed in a Bellanca Skyrocket belonging to the Navy.

The Department of Commerce has ordered thirteen Switlik chair packs to be placed in four Bellancas and one Stinson.

"Macon" Commissioned in the Navy

A RECOMMENDATION that the Navy accept the airship *Macon*, subject to routine tests, was made by the Board of Inspection and Survey, according to Secretary of the Navy Swanson June 15. The recommendation followed a successful endurance test cruise of 48 hours, 50 minutes, made by the *Macon* over Ohio, Indiana, Michigan, Illinois and Lake Erie and Lake Michigan. The airship returned to her base at Akron, Ohio, June 14 and was commissioned June 23.

It is reported that the *Macon* will be based temporarily at the Naval Air Station at Lakehurst, N. J., leaving for her permanent base at Moffet Field, Calif., by October 20.

Comdr. Alger H. Dresel, the *Macon's* commanding officer, will be assisted by the following: Lieutenant-Commanders J. C. Arnold and B. J. Rodgers; Lieutenants S. E. Peck, C. W. Roland, A. L. Danis, H. N. Coulter and W. E. Zimmerman; Chief Boatswain W. A. Buckley; Lieutenants (j. g.) J. D. Reppy and G. W. Campbell; Chief Machinist E. C. Thurman, and Lieut. (CC) C. M. Bolster.

B/J Secures Naval Observation Order

THE B/J AIRCRAFT CORP., of Baltimore, Md., has been awarded a contract for the construction of nine observation planes and spare parts for the Navy, it has been announced. According to officials of the company, the contract price is approximately \$200,000. Work is now under way, and completion is expected by the latter part of September. The planes are of the OJ-2 type and are convertible for use on either land or water. Eighteen planes of a similar design have already been constructed by the B/J plant for the Navy. Powered with a 420-horsepower Pratt & Whitney Wasp, Jr., each ship has a cruising speed of 135 miles per hour and a top speed of slightly more than 150 miles an hour.

War Secretariate for Air Abandoned

ASSISTANT SECRETARY Woodring of the War Department will assume the duties formerly pertaining to the office of the Assistant Secretary of War for Aeronautics, according to a news report last month. Since the resignation of the Hon. F. Trubee Davison from the latter post, it has remained unfilled, and its permanent abandonment has been decided upon.

Mrs. Curtiss Receives Flying Cross

A DISTINGUISHED FLYING Cross was awarded posthumously June 12 to the late Glenn Curtiss, aeronautical pioneer. The presentation was made by Maj.-General Benjamin D. Foulois, chief of the Army Air Corps, to the flier's mother, Mrs. Lulu Curtiss.

Flying Police Prove Their Value

THREE LIVES were saved and a missing yacht was recovered recently through the activities of the New York flying police. In the first adventure, on May 27, three men who were being swamped in a small motor boat on a sandbar in a heavy sea off Rockaway Beach, N. Y., were rescued by Policemen Frank Harkins and Joseph Schmidt. The flying police had been summoned from their base at Floyd Bennett Field by Sgt. Edward Cooney, who saw the plight of the men in the boat. Landing their amphibion in the rough waves just after George Bourocere had been washed overboard from the motor boat, the two policemen pulled Bourocere aboard and skillfully piloted the plane to the boat and took off Anthony Morone and Edward Frank, taxying with the rescued men to shore.

Four days later the yacht, which belonged to Russell Garretson and had been taken from its mooring at New Brunswick, N. J., on May 28, was recovered by Police Capt. A. W. Wallender, Sgt. Joseph Forsythe, Mechanic Frank Harkins and Pilot Peter Perranova. They also captured two men aboard the boat who were alleged to have stolen it. The yacht was retaken in an inlet in Jamaica Bay, N. Y., where it had been discovered from an airplane by Kenneth R. Unger and Charles Appleby, who notified the police.

New Randolph Field Class Totals 150

THE WAR DEPARTMENT announced last month that the class to enter the Air Corps primary flying school at Randolph Field, Tex., July 3 will number 150 students. Among them will be sixty-four of this year's graduates from the Naval Academy at Annapolis, sixty-five civilians, seventeen enlisted men of the Air Corps and four enlisted men of other branches.



U. S. Army blimp TC-13, powered with two Pratt & Whitney Wasp engines and described in the June AERO DIGEST

Colorado Fliers Study Photography

EVERY OFFICER in the 120th Observation Squadron, Colorado National Guard, at Denver, has enrolled for a course in military photography, according to a recent report. The course includes the operation of both K-11 and K-5 cameras in taking obliques, pin-points and mosiacs. According to First Lieut. Cecil Braddick, who commands the Photo Section, work has been very satisfactory.

The Photographic Section is the most popular one at Lowry Field, Denver, and there is a long waiting list for enlistment. An extra drill is conducted every Wednesday night which is enthusiastically attended without extra pay, it is reported.

Recreation Buildings at Langley Field

LANGLEY FIELD, Va., now possesses a new post theater and gymnasium. The theater, which accommodates 660, replaces the wartime building previously used.

The new gymnasium is 183 feet by 113 feet. Two basketball courts, a boxing arena, locker rooms and showers for both the home club and visiting teams, a trophy room, offices and space for bowling alleys are included.

Philadelphia Naval Reserves Honored

THE SECRETARY of the Navy has awarded letters of commendation to the officers and enlisted men of the Naval Reserve Aviation Division VN-5RD4, of the Fourth Naval District, Philadelphia, Pa., for their services at the time of the loss of the *Akron* on April 4. The assistance rendered by this division involved twenty-five hours of patrol over water and over fifty-seven hours of patrol along the coast line, all under adverse weather conditions, and was rendered without pay.

Coast Guard Fliers Save Injured Men

TWO MORE RESCUES were credited to Coast Guard aviators last month. On June 3 a Coast Guard amphibion from the Gloucester, Mass., base flew 170 miles to bring to shore a fisherman who was bleeding to death after an accident on a steam trawler. The amphibion flew him to Boston for hospital treatment.

Another flight from the Gloucester base was made 150 miles to sea on June 13 to remove a sailor with a concussion of the brain from the steamer *Shawmut*



Vought V-80 single-seater

off Boston. The plane made the trip to the steamship and then to Boston in about four hours.

Boeing Obtains Service Parts Orders

SPARE PARTS orders totaling over \$354,839 in value were received by the Boeing Airplane Co., Seattle, Wash., from the Army and Navy in May, the company has announced. Included in the items called for are 100 pursuit upper wings, complete with emergency flotation gear, for delivery to island possessions.

Pennsylvania National Guard Maneuvers

EIGHT PLANES of the 103rd Observation Squadron, 28th Division Aviation, Pennsylvania National Guard, took part in a demonstration staged by four units of the national guard at Wings Field, Blue Bell, Pa., on June 3. A night air attack on the field was the main feature. Two searchlights of Battery A, 213th Coast Artillery, made targets of the air squadron, while guns of Battery C defended against the air attack.

Later in the demonstration, a troop of the 103rd Cavalry went out on night patrol. After a flare had been dropped by one of the planes in the squadron, and the attention of both searchlights had been secured, an attack was made upon the cavalry.

New Commandant at Hatbox Field

FIRST LIEUT. E. SULLIVAN has been transferred from Randolph Field, Tex., to Hatbox Field, Muskogee, Okla., as commandant to succeed Capt. Roy W.

Camblin, who is now at Barksdale Field, Shreveport, La. Captain Camblin is in command of the 7th Pursuit Squadron at that field.

Pearson Field Commandant Transferred

LIEUT. CARLTON F. BOND, who has been commandant of Pearson Field, Vancouver, Wash., for the past four years, directing the activities of the 321st Observation Air Corps Reserve Squadron, has been assigned to attend the 1933-34 air tactical school at Maxwell Field, Montgomery, Ala. He is succeeded as field commandant by First Lieut. Paul D. Burrows, former post adjutant at March Field, Riverside, Calif.

DEVELOPMENT OF RACING

(Continued from page 15)

high-speed racers are few and far between and because the province of sport flying by amateurs lies in a different latitude. Professional racing pilots are trained only by years aloft. Super-racing planes are not things for pleasure, idle sport, social foregathering. They are serious things of life and death—mostly death, as Italy has found out. Airplane racing, in the high-speed categories, is the most dangerous business in the world. Then, too, but one man may ride. It will never be a thing for friendly rivalry of competing stables owned and fancied by sport lovers; there are other forms of air competition to fill that bill. It is a business for government. The whole nation profits. It is a matter directly affiliated with proper national defense. It is not right to expect the millionaires to support it any more than it is to ask them to build our battleships, or man our big guns.

Air supremacy is somehow inseparably linked with air speed. Since the dawn of history those people who possessed the best and fastest transportation have led the world. For ages this means of transportation was the horse—now it is airplanes. Our leaders charged with national defense, when seeking the formula for arms, apparently turn back the pages of history to see what weapons and methods Napoleon favored and proudly come up with the quotation, "God is on the side of the biggest gun." All unmindful are they that if the Little Corporal lived today he would revise that maxim to read:

"God is on the side of the fastest airplane."

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AERONAUTICAL INDUSTRY

Plans for Stratosphere Flight

THE TENTATIVE DATE set for the ascension into the stratosphere by Lieut. Comdr. T. G. W. Settle and either Prof. Auguste Piccard or his brother, Jean Piccard, from Soldiers' Field, Chicago, Ill., has been set for July 11 or 12, it was announced last month. The flight is to be made in a cylindrical metal gondola, seven feet in diameter, attached to a balloon.

Hatchways for entrance into the gondola will be arranged so that they can be sealed, in order that the pressure inside will not decrease as the balloon climbs into the stratosphere. Instruments for collecting data and making observations on the cosmic ray and on meteorological conditions will be arranged about the inside of the gondola, where they are within easy reach and easily visible. The instruments have been designed by Prof. Arthur H. Compton of the University of Chicago, and the taking of data will be

under the direction of the university.

The gondola will be carried aloft by a 800,000-cubic-foot-capacity balloon under construction at Akon, Ohio, by the Good-year-Zeppelin Corp. This balloon is one-fifth larger than the balloon that carried Professor Piccard to a world's altitude record in 1932. The balloon will carry only 125,000 cubic feet of hydrogen for the take-off, however, as at its peak altitude the gas will expand five times its sea-level volume. The fabric will be of the single-ply type used in racing balloons, and will be treated to reflect heat rather than absorb it.

The stratosphere flight will probably start near midnight, and the ascent will be slow, allowing for observations at various predetermined levels. These observations will be broadcast from the gondola through the National Broadcasting Co. and an hour-by-hour report will be made. The flight will last approximately twenty hours.

Sponsors of the flight include, besides the broadcasting company, the *Chicago Daily News* and A Century of Progress.

Milwaukee Plans Three Air Meets

THREE air shows are planned for Milwaukee during the next three months. The first will be held July 18 and 19 in connection with the city's Homecoming Week and the national Elks convention. The American Air Race Association is expected to send fifteen planes to Milwaukee for a two-day circus, either at the county airport or at the lake front.

International fliers who will attend the Chicago World's Fair are expected to go to Milwaukee for an air show during the national Veterans of Foreign Wars convention in Milwaukee August 27 to September 1. The third air show is scheduled to be held in September in connection with the national convention of the Exchange Clubs of America.

Coming Events

Aeronautical exhibit at A Century of Progress Exposition, Chicago, Ill.

Continued to NOV. 1.

Soaring camp at Elmira, N. Y., under the auspices of The Soaring Society of America.

Continued to JULY 16.

German Air Sport Exhibition at Munich, Germany.

JULY.

Merseyside Aviation Display at Liverpool Airport, England.

JULY 1

Start of second annual cruise to the Thousand Islands, Ontario, Canada, by members of the Pylon Club, Philadelphia, Pa.

JULY 1.

American Air Races at Chicago, Ill., municipal airport, under the management of the Chicago Air Race Corp.

JULY 1-4.

National Air Races of 1933 at Los Angeles, Calif., municipal airport.

JULY 1-4.

National meeting of the Ninety-Nines at the St. Francis Apartment Hotel, Hollywood, Calif.

JULY 3.

Air races at Findlay Airport, Findlay, Ohio.

JULY 4.

Air show at San Jose, Calif.

JULY 4.

Dedication of American Legion Dale Jackson Airport, Fari-bault, Minn.

JULY 4.

Dedication of the Norfolk-Tide-water Airport at Norfolk, Va.

JULY 4.

Annual meeting of the Women's National Aeronautical Association at the Palmer House, Chicago, Ill.

JULY 5-7.

King's Cup Race, at Hatfield air-drome, Hertfordshire, England.

JULY 8.

Sectional charity air meet at Atlanta, Ga., under the auspices of the Amateur Air Pilots Association.

JULY 9.

Fourth Annual National Soaring Contest at Elmira, N. Y.

JULY 10-23.

Balloon ascent into the stratosphere by Lieut. T. G. W. Settle at Soldiers Field, Chicago, Ill., under the direction of Prof. Auguste Piccard.

Tentative, JULY 11 or 12.

Third Annual Invitation Seaplane Cruise of the Long Island, N. Y., Aviation Country Club to Lucerne, Ontario, Canada, and Westport, N. Y.

JULY 13-17.

International aeronautic rally at Dieppe, France.

JULY 15.

Air show at Indianapolis (Ind.) Municipal Airport, including air races, aerial demonstrations and model contests, under the auspices of The American Legion.

JULY 15-16, Advanced from Sept. 9-10.

Air cruise from airports in the New York metropolitan area to the National Soaring Contest at Elmira, N. Y.

Tentative, WEEK-END of JULY 15.

Air cruise from Pittsburgh, Pa., airports to the National Soaring Contest at Elmira, N. Y.

Tentative, WEEK-END of JULY 15.

Air show at the Williamson-Johnson municipal airport, Duluth, Minn., under the auspices of the Duluth Aviation Club and the David Wisted Post of The American Legion.

JULY 16.

Air Circus at Milwaukee, Wis., in conjunction with the city's home-coming week and the national Elks convention.

JULY 18-19.

International aeronautic rally on the Belgian coast.

JULY 22-24.

Conference of Aeronautics Branch, Department of Commerce, and aircraft manufacturers at Washington, D. C., to discuss proposed changes in airworthiness requirements for aircraft.

JULY 27.

Second Annual Jamestown Air Races, under the auspices of the Jamestown Airways, at Jamestown, N. Y.

JULY 29-30.

German Air Sport Exhibition at Hamburg, Germany.

AUG.

Air show at Milwaukee, Wis., in connection with the national convention of the Veterans of Foreign Wars.

AUG. 27-SEPT. 1.

International Automotive Engineering Congress under the auspices of the Society of Automotive Engineers at the Palmer House, Chicago, Ill.

AUG. 28-SEPT. 4.

Gliding competition at Banne d'Ordanche, France.

AUG. 30-OCT. 3.

Air show at Milwaukee, Wis., in connection with the national convention of the Exchange Clubs of America.

SEPT.

Sectional charity air meet at Indianapolis, Ind., under the auspices of the Amateur Air Pilots Association.

SEPT.

Sectional charity air meet at Springfield, Mass., under the auspices of the Amateur Air Pilots Association.

SEPT.

International air meet and Gordon Bennett Balloon Race at Chicago, Ill., in connection with A Century of Progress Exposition.

SEPT. 1-4.

Annual air meet of the Toronto (Ontario) Flying Club.

SEPT. 9.

Essex Aviation Display at Hillman's Aerodrome, Romford, England.

SEPT. 9.

American Legion air meet at Chicago, Ill.

SEPT. 30-OCT. 8.

National air treasure hunt, beginning at St. Louis, Mo., and ending at New York, N. Y., under the auspices of the United States Amateur Air Pilots Association.

OCT. 3-7.

National charity air pageant, under the auspices of the Judson Health Center, the Emergency Exchange Association and the Amateur Air Pilots Association, at Roosevelt Field, Mineola, L. I., N. Y.

OCT. 7-8.

German Air Sport Exhibition at Hanover, Germany.

NOV.

International aeronautic rally at Cairo, Egypt.

DEC.

Waco Reports Good Business

THE WACO Aircraft Corp., Troy, Ohio, made a net profit of \$34,310 for the year's quarter ended March 31, it is reported. This exceeded the net profit for the entire year of 1932, which was \$28,171. Total net sales for the first quarter this year amounted to \$221,722, as compared with \$83,133 for the corresponding period last year. The company has reported a large volume of orders recently and has employed additional workers.

An order for a Waco seaplane has been placed with the company by B. Ashley, with headquarters at Toronto, Ontario, who will use the ship for gold mine exploration work in northern Ontario and Quebec. Another order was received from Nat Browne of Fairbanks, Alaska, for a cabin seaplane.

Duluth, Minn., to Have Air Meet

THE DULUTH (Minn.) Aviation Club and the David Wisted Post of the American Legion will be joint sponsors of an air show at the Williamson-Johnson municipal airport of Duluth July 16. Scheduled events include speed dashes, parachute drops, stunting exhibitions, ribbon cutting, balloon bursting and bomb dropping.

Plans for Long-Distance Flights

COL. WILLIAM E. EASTERWOOD of Dallas, Tex., announced last month that he would offer a prize next year for a non-stop flight around the world with three refuelings while in the air. Plans for a similar flight by Clyde Pangborn

for next year were reported recently. He expects to cover the distance in a special plane, traveling via New York, Moscow and Chita, Siberia.

Roger Q. Williams, who in 1929 flew with Lewis A. Yancey from Old Orchard, Me., to Spain in an attempted non-stop flight to Rome, Italy, has stated that he will take off July 24 from Floyd Bennett Field, Brooklyn, N. Y., on a flight to the Italian capital via the Southern Atlantic route. After a short trip to Greece, he plans a return flight to the United States, via Dublin, Ireland, and non-stop over the North Atlantic. He will fly with a co-pilot and a radio operator in a specially built Bellanca Airbus, *The Flying Southpaw*, powered with a Wright Cyclone engine and having a maximum speed of 165 miles per hour. The plane will have a cargo compartment of 1,000 pounds' capacity and will be equipped with blind-flying instruments, a short-wave transmission and receiving radio set and instruments to record weather conditions along the route.

Last month Russell Boardman, former holder, with John Polando, of the world's long-distance flight record, announced that he is planning a trans-Atlantic flight to Rome, starting from New York before July 24. The Bellanca monoplane, *Cape Cod*, in which their record flight was made, is reported to be in the process of preparation for the new flight.

Jamestown, N. Y., Plans Air Meet

THE SECOND Annual Jamestown (N. Y.) Air Races are scheduled to be held July 29 and 30 under the auspices of the Jamestown Airways. Among

events that are planned for the meet are races for all classes of planes, bomb dropping, spot landing, parachute jumping and aerobatics.

Official Weather Maps Twice Daily

MAPS showing wind direction and velocity in the upper air at various levels up to 13,000 feet, and in some cases at higher altitudes, will be issued at important terminals on the Federal Airways System twice daily beginning July 1, the Aeronautics Branch of the Department of Commerce announced last month. Upper air data will be transmitted over the Department of Commerce teletypewriter system in the usual way, and the maps will be made up at the points where they are to be distributed to aviators, the teletypewriter operators inserting data on blank maps on the basis of reports received on their machines.

Maps issued in various localities cover the northeast, southeast, north-central, south-central, northwest and southwest sections of the United States. On the individual sheet for one section of the country, the region portrayed appears six times, permitting notations for six different altitudes. Referring to his teletypewriter reports, the operator inserts arrows flying with the wind and figures representing wind velocity at various points on the first blank map on his sheet to show surface conditions. He then repeats the process on the other five blank maps to indicate conditions at various levels above the ground. After completing the map, he makes a number of hectograph copies so that pilots may have copies to carry with them.

Digest of Recent Events

Italy Again Breaks World's Speed Record

Flying at a speed of 440 miles per hour over Lake Garda, Italy, Warrant Officer Francesco Agello unofficially broke the world's speed record. The record-breaking plane was a Macchi 72 seaplane, powered with a Fiat 2800-horsepower A. S. 6 engine, the same type that had twice broken the speed record in April. Stanavo special aviation fuel was used in each of the three flights. Warrant Officer Agello, who is a member of the Italian Speed School at Densenzano, piloted the Macchi on one of the former record-breaking flights. JUNE 2.

Hawks and Robot Exceed Non-Stop Transcontinental Record

Lieut.-Comdr. Frank Hawks, in his Northrop Gamma, powered with a Wright Whirlwind R-1510

engine, crossed the continent non-stop, from the Municipal Airport at Los Angeles, Calif., to Floyd Bennett Airport, Brooklyn, N. Y., in a little less than 13½ hours. A De Beeson automatic pilot guided the ship during most of the flight, Commander Hawks piloting only during the first and last sections of the trip. JUNE 2.

Mattern Flies Solo New York to Moscow

Breaking the speed record between New York and Moscow, Russia, James J. Mattern, flying solo in the rebuilt, Wasp-powered Lockheed, *Century of Progress*, on an attempted solo flight around the world, covered the distance of about 4920 miles in an actual flying time of a little less than thirty-two hours. Taking off from Floyd Bennett Field, Brooklyn, N. Y., he landed at Jomfruland Island, off the southern coast of Norway, after a 3670-mile flight of about twenty-

four hours. Proceeding to Oslo, Norway, and to Moscow, he reached the latter city after an elapsed time from New York of 51 hours, 36 minutes, with an average speed of about 157 miles per hour. JUNE 3-5.

Spanish Aviators Fly Non-Stop to Cuba

Capt. Mariano Barberan and Lieut. Joaquin Collar, Spanish Army fliers, made a non-stop flight estimated at 4906 miles, about 4500 miles of which were over water, from Seville, Spain, to Camaguey, Cuba. The airplane used was a Breguet XIX Grand Raid, *Cuatro Vientos*, built in Spain and powered with a 650-horsepower Hispano-Suiza engine. The flight, which was made in a little less than forty hours, the fliers later proceeding to Havana, was financed by the Spanish Government. JUNE 10-11.

Three Americans Make Non-Stop Flight to Haiti

The rebuilt Bellanca monoplane, *Columbia*, veteran of two trans-Atlantic flights, carried Capt. J. Erroll Boyd, Robert G. Lyon and H. P. Davis on a non-stop 2470-mile flight to near St. Marc, Haiti. Powered by a 200-horsepower Wright Whirlwind engine, the *Columbia* covered the distance in exactly twenty-four hours. The following day the flight proceeded to Port-au-Prince, where the President of Haiti was later taken for his first airplane ride in the *Columbia*. JUNE 11-13.

Mattern Flies Across Siberia

Continuing on his solo world flight attempt, James J. Mattern piloted his rebuilt Lockheed, *Century of Progress*, from Moscow, Russia, to Omsk, Siberia; Bielowo, Krasnoyarsk, Belyoe and Khabarovsk, Siberia, in five days. He took off from Khabarovsk in the direction of Nome, Alaska. JUNE 14.

American Aircraft Production Report

OFFICIAL FIGURES from the Department of Commerce place the total production of American aircraft for the first quarter of 1933 at 298 units. Of these 102 were military airplane deliveries, 100 were domestic civil aircraft and 96 were exported. A total of 69 monoplanes were manufactured for domestic civil use, two being amphibions, 46, open-cockpit landplanes, and 21, cabin landplanes. The 29 biplanes consisted of 11 open-cockpit ships and 18 cabin jobs, including one amphibion. Two autogiros were produced during the period.

Dr. Moss Receives Foundation Award

ONE of the thirty-one General Electric employees who this year receive Charles A. Coffin Foundation awards is Dr. Sanford A. Moss of Lynn, Mass., who designed and introduced the centrifugal supercharger for airplane engines. Introduced largely since the War, Dr. Moss's supercharger is part of the engine equipment on practically every military, naval and transport airplane in the United States. It has been a dominant factor in developing modern high-altitude flying, as well as long-distance non-stop and long-distance high-speed flying, for it not only supercharges engines at high altitudes but also increases the engine's power at sea level.

Bendix Products Sales Director Named

FRANK B. WILLIS has been appointed vice president in charge of sales of the Bendix Products Corp., South Bend, subsidiary of Bendix Aviation Corp. This appointment brings together under one direction the sales activities of The Bendix Brake Co., Bragg-Kliesrath Corp., Bendix-Stromberg Carburetors, Bendix-Cowdrey Brake Tester and the Aviation Wheel Division.

The Bendix Corp. board of directors was reduced from sixteen to eleven members by the stockholders of the company recently. V. W. Kliessrath, president of Bragg-Kliesrath Corp., a subsidiary, was elected to the board. Other members following the change were:

Vincent Bendix, Albert Bradley, Walter J. Buettner, Paul H. Davis, Richard F. Hoyt, A. L. Humphrey, Charles Marcus, W. L. McGrath, C. O. Miniger and C. E. Wilson.

Goodrich Department Head Chosen

W. C. BEHOTEGUY, merchandising manager of the B. F. Goodrich Co., Akron, Ohio, has been named manager of the automobile tire department, responsible for sales of Goodrich passenger car tires and aeronautical sales.

Fay & Egan Company Chooses Officers

AT THE ANNUAL MEETING of the woodworking machinery firm of J. A. Fay & Egan Co. of Cincinnati, Ohio, held recently, S. M. Blackburn was elected president and general manager. Clifford P. Egan was chosen vice president, and Espy Bailey, secretary and treasurer. R. W. Egan and F. T. Egan, formerly president and vice president, respectively, have retired from office and as directors of the company.

Goodrich Tire Prices Rise

AN ADVANCE in tire prices averaging eight to nine per cent has been announced by J. D. Tew, president of The B. F. Goodrich Co., Akron, Ohio. The increase will cover the entire Goodrich tire line. Prices of most raw materials used in tires and tubes have recently shown marked increases, it was stated.

Goodrich recently announced that tire production in its Akron factories had been increased 200 per cent in May as compared to March, bringing about \$500,000 in increased payrolls for May as compared to March.

Oil Companies Buy Parachutes

IN A NEW Bellanca built for the Richfield Oil Co. of California, five Switlik Department-of-Commerce-approved chair-type parachutes have been installed, according to the Switlik Parachute & Equipment Co. of Trenton, N. J. Four Switlik parachutes of the same type have been installed in a new Bellanca belonging to the Standard Oil Co. of Kansas.

Plane Builders Use Western Electric

SEVEN of the leading plane manufacturers in the United States now make provision for complete two-way Western Electric radio telephone equipment in the standard design of all transport planes produced by them. They are the Airplane Development Co., Boeing Airplane Co., Curtiss-Wright Airplane Co., Douglas Aircraft Corp., General Aviation Mfg. Corp., The Northrop Corp. and Stinson Aircraft Corp.

Museum to Open Aeronautic Section

A SPECIAL AVIATION SECTION is planned as part of the new Franklin Institute Museum in Philadelphia, Pa. While the new museum is not expected to be completed until the latter part of the year, the institute has already acquired two famous airplanes for part of the exhibit. The Lockheed monoplane flown across the Atlantic by Mrs. Amelia Earhart Putnam and the *St. Louis Robin* of endurance-flight fame have been procured and will be housed permanently in the museum. Other planes will be mounted, with accessible controls.

A large collection of aircraft engines will also be displayed, showing the development of the airplane engine from the earliest Wright type to the present. Many of the engines have been sectioned, since it is planned to show their internal construction and operation. All will be motor-driven, so that they can be operated by spectators.

A collection of model aircraft, all made to the same scale, will show very essentially different type of airplane which has been developed. All airplane instruments used in aviation will be on exhibition. These instruments will not only be displayed in their entirety but will be opened to enable understanding of their operation.

The Franklin Institute wind tunnel, made especially by the institute and incorporating unique features, will, with scientific apparatus, serve to demonstrate the physical principles of aviation.

The purpose of the aviation exhibit is primarily to teach the principles of flying. At a later date it is expected that glider contests will be encouraged by the Franklin Institute, special emphasis being placed upon the scientific elements of motorless flight.

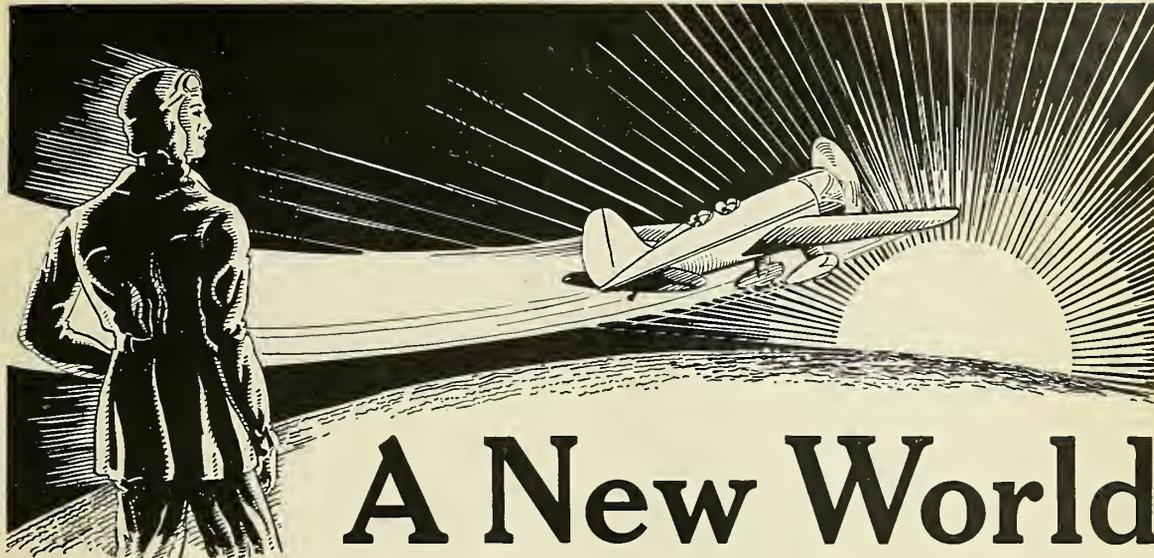
Clark Transports Sold to Swissair

THE GENERAL AVIATION MFG. CORP. of Dundalk, Md., has sold several Clark GA-43 transport airplanes to Swissair, one of the largest passenger plane operators in Europe. This new type plane was described in the February *AERO DIGEST*. Swissair operates services among Zurich, Switzerland; Vienna, Austria; Berlin, Germany; Paris, France; Milan, Italy, and other cities.

(Continued on following page)



The new Stearman Model 80 on twin Edo floats



A New World For Ambitious Men . .

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The world you face today is changing while you look at it . . . breaking every tie of the past, and springing upward into a limitless future. It's *your* world . . . do you realize that?

The older generation is practically out of it. Already this new world is growing too large for their hands. You must take it, shape it, and drive it toward the goal. We can help you to begin; the outcome will be *your* triumph. You will conquer a new kingdom whose borders we have only crossed.

Learn to Fly—NOW!

Already you hear the roar of motors and the beat of wings that shall carry mankind, in your day, in full flight toward a new dominion, wider and more splendid than your greatest dreams.

Into your hands falls this new world. The future is anything you care to make it. The rewards are tremendous. Are you ready to carry on?

For the mastery of aviation, as we see its beginning, and as you will see its triumph, you need the finest training you can possibly obtain. Parks Air College exists for one purpose . . . to train you thoroughly, effectively and completely for this new day.

This institution is the largest commercial aviation school in the world, owns its own airport, and has over \$750,000 in facilities to train you. Aircraft executives have declared its graduates to be the finest material coming into aviation.

Today . . . NOW . . . is the time to decide on *your* start toward a great and brilliant future. Parks training opens wide the door. To understand it in detail, send the coupon at once for a free copy of "Skyward Ho!".



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WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

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- Executive Transport Pilots'
- A. & E. Master Mechanics'
- Limited Commercial Pilots'
- A. & E. Mechanics'

(Continued from preceding page)

Al Williams Takes Gulf Refining Post

CAPT. AL J. WILLIAMS has accepted the position of manager of aviation sales with the Gulf Refining Co., Pittsburgh, Pa. Former holder for eight consecutive years of the American speed record for airplanes, Captain Williams is one of America's foremost exponents of aviation. He is also one of the officers of the Delaware Chemical Engineering Co., a writer on aeronautical subjects, a lecturer of note, a lawyer in the State of New York and a captain in the Marine Corps, Reserves.

Texaco Obtains Aeronautical Contracts

GASOLINE requirements of United States Airways, operating between Kansas City, Salina and Goodland, Kans., with passengers, mail and express, will be supplied by The Texas Co. under a contract announced recently by J. D. (Duke) Jernigin, superintendent of the Texaco aviation division.

A contract calling for supply of the entire gasoline, oil and grease requirements of five of the Curtiss-Wright Flying Service bases has been renewed with The Texas Co. The bases in the contract are the New York Air Terminal at North Beach, Queens; Curtiss Valley Stream Airport on Long Island; Curtiss-Essex at Caldwell, N. J.; the Chicago Air Terminal and the Milwaukee Air Terminal. Texaco has also contracted to supply two grades of aviation gasoline to the Wright Aeronautical Corp.

Oregon Aeronautic Interests Organize

RECENTLY ORGANIZED at Portland, the Oregon Aviation Association now includes in its membership more than seventy-five per cent of the aviation interests of that state.

Lieut. Basil B. Smith is president of the organization, which will make a study of light plane flying in Oregon in cooperation with the State Board of Aeronautics. More than 100 light airplanes are under construction or planned in the state.

Other officers of the new organization are H. H. Hobi, manager of Eugene airport, first vice president; Dr. Raymond Staub, Portland, second vice president; M. S. Rasmussen, Portland, secretary, and William Foster, Portland, treasurer. Governors of the group include: Lee Eyerly, Salem; Art Walters, Baker; Lieut. James L. Meadows, Portland; S. Perkins, La Grande; Edith Foltz and Cecil Pounder of Portland.

Boeing Finishing United Transports

WITH OVER HALF of the new Wasp-powered Boeing transports already delivered to United Air Lines, the Boeing Airplane Co. of Seattle, Wash., has broken all its previous records for production of large commercial planes. The



Latest version of the Fairchild 22, Menasco powered

balance of United's sixty new carriers are being finished at the rate of ten a month.

The thirtieth of the Boeings has been designated as a United Aircraft & Transport executive plane. It will be the same as the others except for the installation of two-row Wasp engines, an aluminum enamel finish, special insignia and eight seats instead of the customary ten.

Hartford Model Contestant Wins Medal

THE WINNER of THE AERO DIGEST medal, first prize in the duration contest of the Connecticut Model Airplane Meet, was John Tyskewicz of Hartford. The meet was held at the State Armory in Hartford, May 27.

Moulded Products Firm Opens Factory

THE OPENING of its new factory at Stonington, Conn., has been announced by Synthetic Moulded Products, Inc., through its president, O. W. Greene, Jr. Products of the plant include moulded parts for the automotive, aircraft and marine trade.

Georgia Adopts Aeronautic Legislation

BY ENACTING statutes making it necessary for all aircraft and pilots operating in the state to be licensed by the Aeronautics Branch of the Department of Commerce, Georgia recently abandoned the position of being the only state without aeronautical legislation.

Minnesota Air Head Selected

COL. L. H. BRITTIN, executive vice president of Northwest Airways, Inc., has been appointed by Governor Floyd Olson as chairman of the recently formed Minnesota Aeronautics Commission. This group of five members, which was established by the 1933 Legislature, is to have full authority over aviation in the state. It will issue certificates of registration for aircraft and pilots as well as issue annual airport and flying school permits. No fee is to be charged for the registration of the licenses of pilots and aircraft, but a yearly payment is necessary for airports and schools that are granted permission to continue their activities.

Air Commerce Heads Appointed

FIVE MEN were chosen last month by President Roosevelt to direct aeronautics in the Department of Commerce. They are Ewing Y. Mitchell, who was appointed Assistant Secretary of Commerce for Aeronautics; J. Carroll Cone, director of aeronautical development; Rex Martin, director of airways; John H. Geisse, supervising aeronautics inspector, and Eugene L. Vidal, director of air regulation. James C. Edgerton was selected as executive assistant for aeronautics to Mr. Mitchell.

De Havilland Representative Appointed

TROWBRIDGE HEATON, of Hillsborough, Calif., has announced his appointment as distributor for De Havilland aircraft. A Fox Moth model, powered with the 130-h.p. Gipsy Major engine, is being used for demonstration purposes.

Western Electric Timer Approved

OFFICIAL APPROVAL by the Fédération Aéronautique Internationale has been given to the Western Electric precision timer and the timing system under which it operates, it has been announced. The Western Electric timer photographs both the race finish and the time of finish in fractions of a hundredth of a second.

Engine Accessories in Production

NEW ROCKER BOX covers for Warner Scarab engines have been designed and are being manufactured by Air Transport Equipment, Inc., of Roosevelt Field, Garden City, L. I., N. Y. The covers are designed to prevent grease from spattering on the sides of the fuselage, to help lubricate the rollers and valve stems and to streamline the rocker boxes, making a neat appearance.

Pacific Airmotive Improves Service

PACIFIC Airmotive Corp., Ltd., United Airport, Burbank, Calif., has increased the scope of its metal propeller service at its United Airport service station, with the addition of Ray W. White, formerly of the Hamilton Standard Propeller Corp., to the propeller department.

(Continued on following page)



SCINTILLA
AIRCRAFT MAGNETOS

VIRTUALLY any airport, any Army air field or Naval air base one visits, will disclose a preponderance of Scintilla Magneto equipped aircraft.

The reason invariably interests a newcomer. He inquires. And equally invariably, the veteran pilots assure him there is no finer ignition available at any price or in any land.

The craftsmen and the engineers who build Scintilla Aircraft Magnetos are mindful of the obligation such trust entails. The product proves this.

SCINTILLA MAGNETO CO., INC.
SIDNEY, NEW YORK
Contractors to the U. S. Army and Navy
(Subsidiary of Bendix Aviation Corporation)

Dependability • Simplicity
Accessibility



WAX YOUR PLANE!



For beauty, protection, ease of cleaning, longer life • Out of the sky comes a plane. All eyes watch it make a perfect landing, turn and taxi to the hangar. Whose plane is it? Doesn't it look clean and shiny—must be brand new.

• Out steps the proud owner—who has learned how to take care of his plane—keep it looking like new, richly polished, free of grease smears. What's the answer?

• Johnson's new wax, that is so remarkably easy to use, taking only half the usual waxing time. With this new wax, your plane need never look dull or weather-worn. The hard, dry coat of wax shields wing and fuselage surfaces from sun, rain, wind, sleet, dirt and grease. Its shiny smoothness adds M. P. H. to the plane's performance. Cleaning is made a simple operation. Dirt and grease come off easily. And the cost is little. If you are a plane owner, use the left hand coupon for a free sample of Johnson's Wax for planes. If a dealer, use right hand coupon.

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Hangars displaying this sign are authorized Johnson waxing stations. If there is none near you, write us direct. Dealers, schools, etc., write for full information.

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Coupon for Plane Owner

S. C. Johnson & Son, Inc., Dept. AD7, Racine, Wis. • Please send me free sample of the new Johnson's Wax.
Name _____
Address _____
City _____ State _____

Coupon for Dealer

S. C. Johnson & Son, Inc., Dept. AD7, Racine, Wis. • Send me full details of your dealer offer.
Name _____
Address _____
City _____ State _____

(Continued from preceding page)

Hunsaker Awarded Guggenheim Medal
THE DANIEL GUGGENHEIM MEDAL, recognizing "notable achievement in the advancement of aeronautics," has been awarded for 1933 to Comdr. Jerome Clarke Hunsaker, vice president of the Goodyear-Zeppelin Corp., Akron, Ohio, it has been announced by Alfred D. Flinn, secretary of the Board of Award. The medal goes to Commander Hunsaker for "contributions to the science of aerodynamics, to the science and art of aircraft design and to the practical construction and commercial utilization of rigid airships."

Commander Hunsaker introduced the application of aerodynamic research in the design of American aircraft first by translating and making available Eiffel's work and later by building the first wind tunnel at Massachusetts Institute of Technology. While in charge of the Aircraft Division, Bureau of Construction and Repair, of the Navy Department, he had the responsibility, under the chief constructor, for the Naval aircraft war program. Commander Hunsaker designed the first modern non-rigid airships produced in the United States as well as the *Shenandoah*. With Gilmore, Westervelt and Richardson, he designed the NC flying boats.

He was chief of the Design Division, Bureau of Aeronautics, from 1921 to 1923. From 1916 to 1921 he was in charge of the Aircraft Division, Bureau of Construction and Repair. Commander Hunsaker was a member in 1917 of the joint Army and Navy Technical Board to frame the aircraft program and was attached to the Inter-Allied Naval Armistice Commission in 1918. He resigned in 1927 as Commander, Construction Corps, United States Navy. He is the author of numerous professional papers on aeronautical subjects.

Bellanca Sells to Brazilian Army

FOLLOWING an order for two Pace-maker photographic planes, powered with Wright Whirlwind 330-horsepower engines, for the Brazilian Army, there was received an order for ten additional planes of the same type, which have been completed and delivered. These Pacemakers are particularly suited for high-altitude photographic work, for transportation of troops or supplies, and were provided with a tubular rear ring for mounting a machine gun through a wide opening in the rear top of the fuselage. Extra wide windows were supplied, as well as floor openings for the camera, view finders and front floor sights for the pilot.

Eight Bellanca Pacemakers have now been placed in service by the U. S. Department of Commerce, the five which had previously been in use giving such satisfaction that the Department decided to acquire three more of the same type.

In addition, an order was recently received from the Department of Commerce for the construction of a Bellanca Skyrocket with Pratt & Whitney Wasp 420-horsepower engine. The equipment of the ships that were recently delivered to the Department included landing lights, flares, bonding and shielding for radio, artificial horizon, wheel pants and ring cowl, as well as provisions for installation of special equipment.

Alameda Kinner Dealer Appointed

R. P. BOWMAN of Alameda, Calif., has been appointed Kinner aircraft dealer in the San Francisco Bay district.

Parts Dealer Opens Business

AIRPLANE PARTS & SUPPLIES, Inc., Glendale, Calif., has been established for the purpose of handling slightly used parts for Pratt & Whitney, Wright, Kinner and other engines. The organization will also carry a line of used aircraft parts and pilots' supplies. Jimmy Meyers, former purchasing agent for Lockheed Aircraft Co., is general manager.

Stinson Exhibit at World's Fair

THREE AIRPLANES, comprising one tri-motored ten-passenger transport airliner and two single-motored four-passenger Reliant cabin monoplanes, are shown by the Stinson Aircraft Corp. in the Cord Corp. space in the Travel and Transport Building at A Century of Progress, Chicago, Ill. Powered with 240-horsepower Lycoming engines, the tri-motored ship is identical with those of the same make which are flown by American Airways and other airlines.

Sectional Airway Maps Available

SEVENTEEN sectional airway maps have been issued by the Aeronautics Branch of the Department of Commerce. The publication of these maps marks the completion of about one-fifth of the project of charting the entire United States with eighty-seven maps designed particularly for air navigation.

Oklahoma Aeronautical Firm Organized

A CHARTER of incorporation was granted the Ardmore Hangar Corp. of Ardmore, Okla., on June 5. Incorporators include F. W. Merrick, Edward Galt and E. H. Morter, all of Ardmore.

Woman Pilot Returns to Active Flying

DOROTHY PRESSLER, Oklahoma City flier, has resigned as secretary of the Oklahoma Aviation Service, Inc., of Oklahoma City to resume active flying. Holder of a transport license, she will be associated with Hardy Young in the demonstration of airplanes and making charter flights.

Aviation Firms Move New York Offices

NEW YORK offices of the following companies have been moved to 1775 Broadway, it has been announced: North American Aviation, Inc.; B/J Aircraft Corp.; Condor Corp. and Transcontinental & Western Air, Inc.

Stinson Reliant Used in Crop Surveys

DELIVERY of the first 1933 Stinson Reliant airplane has been made by the Stinson Aircraft Corp. to W. D. Gann of New York, N. Y., who has engaged Miss Elinor Smith as his pilot. Mr. Gann will use the plane to tour the agricultural sections of the country for gathering crop and business statistics for clients of the advisory service of which he is the head. He will be the first stock and crop market analyst to use the air for his surveys, it is reported.

Airplane Manufacturers Change Name

WILLIAM BROWN & CO. have moved to E. 404 Sprague Street, Spokane, Wash., and have changed their name to the Brown Metal Works. The company manufactures the Metalarks, low-wing all-metal planes.

Detroit Air Races Not To Be Held

PLANS for the air race meet at Detroit, Mich., which had been scheduled for July 15-16, have been abandoned, it was announced recently.

Mexico Orders Six Fleet Planes

CONSOLIDATED Aircraft Corp. of Buffalo, N. Y., has announced the placing of an order with it by the Mexican Government for six special training airplanes. These planes will be powered with Kinner R-5 160-horsepower engines and will be equipped for the special use of the Escuela Militar de Aviacion at Mexico City. It is expected that manufacture of the planes will be completed about July 15.

Spark Plug Firm Appoints Manager

O. C. LEIGHTY, territory representative for the Champion Spark Plug Co. in New England, has been appointed district sales manager. G. W. Axt succeeds Mr. Leighty as territory representative in the Boston area.

Ex-Cell-O Makes Organization Changes

THE CONTINENTAL Tool Division of Ex-Cell-O Aircraft & Tool Corp. has moved to the main plant of Ex-Cell-O, at 1220 Oakman Boulevard, Detroit, Mich.

M. J. Schmitt of West Allis, Wis., has become representative of the company in the Milwaukee territory, handling both the products of the Continental Tool Division and those of Ex-Cell-O.

Airship Added to Smithsonian Exhibits

THE SMITHSONIAN INSTITUTION at Washington, D. C., recently installed among its thousands of exhibits the Goodyear airship *Pilgrim*. Lack of space in the museum prevents the ship from being exhibited entire, so the gondola forms the main part of the exhibit with a portion of the gas bag attached.

The *Pilgrim* was the first airship designed for inflation with helium gas instead of hydrogen and was completed early in 1925. Up to December 30, 1931, when it was retired from service, the *Pilgrim* had made 4,765 flights, carried 5,355 passengers, flown 2,880 hours and covered 94,974 miles, flying more than any other non-rigid airship.

Library Aeronautics Division

ACCOMPLISHMENTS of the Aeronautics Division of the Library of Congress are related in a recently published report of the division for the fiscal year ending June 30, 1932. Prepared by Dr. Albert F. Zahm, chief of the division, the report describes new acquisitions of material by the section and tells of the assistance rendered by it to Governmental departments and individuals in search of aeronautical information.

About 2,000 books and pamphlets, including the whole range of aeronautic literature, were added to the division's material during the year, according to the report. The largest single gift was a complete file of the technical reports of the Air Corps Materiel Division. The Naval Bureau of Aeronautics contributed a file of the non-confidential aeronautical reports of the Naval Aerodynamical Laboratory. Dr. Zahm presented from his private collection 160 volumes of aeronautical works and early catalogs, programs and clippings. Gifts from other individuals included a biography of Frederick Marriott, a typewritten history and log of the 96th Aero Squadron, U. S. Army, and illustrated accounts of formal honors paid in France to Clement Ader.

Pacific Airmotive Officers Elected

EDGAR N. GOTT, former president of the Keystone Aircraft Corp., recently was elected a director of Pacific Airmotive Corp., of United Airport, Los Angeles, and Oakland Airport, Calif., replacing Ross Hadley. Directors re-elected at the annual meeting included: W. E. Thomas, Palmer Nichols, H. A. Burgess and Allan Loughead. Mr. Thomas continues as president-treasurer, with Mr. Nichols as vice president-secretary.

To their other facilities, the company has added a fireproof "dope" room. Furnace installation keeps inside temperatures at an even eighty degrees, and a ventilating system completely changes the air every three minutes.

TRADE LITERATURE

Stanavo Handbook for 1933

• UP-TO-DATE CHARTS, maps and miscellaneous information are features of the pocket-size fourth annual edition of the Stanavo Pilot's Handbook for American licensed pilots. Issued by the Stanavo Specification Board, Inc., the booklet also provides a convenient form for recording important memoranda while on cross-country flights. A quick reference is afforded to useful aeronautical information, including data on weather, radio, air traffic rules, aviation, aviation petroleum products, airports of entry, Department of Commerce publications and air records. This material fills more than 100 pages, in addition to which miniature maps, a notebook and a removable pad are supplied. As in last year's edition, a course protractor is provided in a pocket in the rear cover. (17)

Catalog of Aeronautical Supplies

• KARL ORT'S new catalog provides interesting reading and information for the casual dabbler in aeronautical purchases as well as for the buyer of many supplies. Written in Mr. Ort's frank, vivid style, the catalog discusses aeronautical commodities ranging from bolts and wire to instruments and engines.

Scattered through the merchandise descriptions and price lists are bits of helpful advice or entertaining data regarding the origin of certain supplies. For instance, on a page relating to dope and related products is a short article on "How to Get a Good Dope Job Cheap." On a page about shirts and jackets appears a brief account of how the suitability of an airplane fabric for shirts was discovered. For the benefit of mail order customers, directions are included for figuring the postage, insurance and special delivery charges on each consignment. (18)

Nickel Alloy Steels in Aeronautics

• AIRPLANES famous for their record-breaking exploits are pictured on two pages of the June issue of "Nickel Steel Topics," published by The International

Nickel Co., Inc. Brief accounts of the performances of these planes, all of which are described as incorporating nickel alloy steel parts, accompany the photographs. Among them are the Rolls-Royce-powered Vickers-Supermarine S6B, former holder of the world's speed record; the De-Havilland-powered Puss Moth with which Amy Johnson made record solo flights from England to Cape Town, South Africa, and return; the Napier-powered Fairey monoplane in which the world's distance record was set and the Westland Wallace biplane, powered with a Bristol Pegasus engine, in which Mount Everest was flown over for the first time.

Two interesting American aircraft also are pictured. They are the Pitcairn cabin autogiro, powered with a Wright Whirlwind engine, and a Kinner-powered Savoia-Marchetti, the hull and structural members of which were fabricated by the shotwelding process of The Edward G. Budd Manufacturing Co. (19)

Rectox Battery Chargers

• THE WESTINGHOUSE Rectox battery charger is completely described and illustrated in a recent four-page publication issued by the Westinghouse Electric and Manufacturing Co. The construction, application and operation of the charger are explained in the leaflet, pointing out the distinctive features of this type of dry, non-chemical, metallic oxide rectifier. (20)

TWA Airway Map and Log

• AN AIRWAY map and log of all the routes of Transcontinental & Western Air, Inc., has been issued by the airline. A twenty-four page book attractively done in two colors, it contains sixteen maps with all the landmarks and interesting physiographic features indicated and briefly described in the accompanying log. Being prepared in booklet form, rather than the usual folder, the map and log is conveniently held while in flight and easily carried in the pocket. The piece was prepared by G. E. Everett, general agent of TWA. (21)

• Readers who are in a position to make use of the information reviewed in our "Trade Literature" columns each month, are invited to use this convenient means of securing the complete booklets described—without obligation. Merely fill out and mail the accompanying coupon, checking by number the booklet or catalog you desire.

AERO DIGEST, 515 Madison Ave., New York, N. Y.

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(18) (21) ADDRESS.....

(19) CITY.....

STATE.....

OCCUPATION OR COMPANY..... 733

FOREIGN NEWS IN BRIEF

Australia

Sir MacPherson Robertson, a Melbourne, Victoria, business man, has offered a check for £10,000 as a first prize in a proposed air race from London, England, to Melbourne, Australia, to take place in 1934 in honor of the centenary of Melbourne. The event will be open to any type of machine from any country.

CAPT. E. C. JOHNSTON has been appointed Controller of Civil Aviation in succession to Colonel Brimsmead.

THE AUSTRALIAN record of 28 minutes, 27.4 seconds, for a model airplane flight, made by Gordon Ratcliffe, has been recognized by the society of Model Aeronautical Engineers of Great Britain. The Model Flying Club has applied for recognition of the flight as a world record.

A PARTY proposes to use planes in a search for the lost Lasseters gold reef in Central Australia. Two planes will fly together, and an examination will also be made of extensive asbestos deposits 130 miles from Laverton.

After a lapse of a number of months, air service was started again in March, a new company from Australia, connected with the New Guinea Airways, making a proposal to the Government of Fiji to form a company with a capital of £20,000 on the condition that it be given some support. This the Government agreed to, and a subsidy of £1,500 per annum was voted by the Legislative Council for a period of three years to assist the undertaking.

Two Genairco seaplanes, built by The General Aircraft Co., Ltd., of Australia, are used. Powered with a Cirrus-Hermes engine, each plane has a cruising speed of 85 miles per hour. Accommodations are provided for three passengers and a pilot.

Flying conditions in Fiji are favorable, since visibility is always good, and by using seaplanes, there is the advantage of being able to land almost anywhere on the water around the Islands, which are protected by reefs.

Upkeep is much more expensive in the operation of seaplanes in Fiji, owing to the corrosion of airplane parts from salt water. Experience is reported to have shown that stainless steel should be used wherever practicable. Although hurricanes are numerous, especially between December and March, from a flying point of view, their effect is not serious except when the plane is very close to land. The seaplanes in use in Fiji have already been found to be useful means of carrying information regarding damage a hurricane has done in distant parts of



Potez 53, powered with a Potez 9B, winner of the race for the Deutsche de la Meurthe cup

the Islands when all other means of communication were cut off.

Service at present maintained is daily to the main ports of the colony, but machines are also available for charter service to all parts of the Islands. The schedule under which the Government subsidy is given calls for the planes to fly 40,000 miles a year, and the transportation of mail wherever they go. The Post Office in Fiji makes no extra charge for mail carried by air, although a great saving in time is effected in the delivery of mail to different parts of the colony.

France

Flying a Potez 53 monoplane, powered with a supercharged 270-horsepower Potez 9B, M. Detré won for France the race for the Deutsche de la Meurthe cup May 29 at Etampes, France, with an average speed of 200.5 miles per hour. M. Delmotte, flying a Renault-Bengali-special-powered Caudron, was second with an average speed of 180.7 miles per hour, and Flight Lieut. N. Comper, in a Swift, powered with a De Havilland Gipsy Major special, was third, averaging 141.5 miles per hour. The race was postponed from May 28 because of weather conditions.

Germany

Announcement of the projected flight of a group of airplanes across the South Atlantic next year was made recently. The flight will be under the leadership of Capt. Herman Köehl, who was a member of the crew of the trans-Atlantic plane *Bremen* in April, 1928, when it crossed the North Atlantic. The tentative route to be followed is from Germany to West Africa, South America and the United States.

BESIDES the heavy-oil aeronautical engine "Jumo 4," a second engine of the same construction has been manufactured by Junkers. This engine, the "Jumo 5," has a maximum output of 540 horsepower at 2100 r.p.m. The engine weighs only

495 kilograms, and the consumption of fuel is as low as that of the Jumo 4, using 170 grams per horsepower-hour at maximum output and 160 grams per horsepower-hour at continuous output.

THE HEINKEL HE 70 mail and passenger transport recently delivered by the Ernst Heinkel Flugzeugwerke, of Warnemünde, to the German Luft Hansa now has a high speed of 235 m.p.h. This speed is official as tested by the German Government aeronautical laboratories. The previous official maximum speed of the plane was 226 m.p.h. The increase in speed is due to minor improvements and a slight increase of power. The engine is a glyco-cooled B.M.W. VI with a compression ratio of 6 to 1 and developing 640 horsepower.

A SPECIAL airplane service has been established in connection with the arrival of the Hamburg-American Line steamers, from Cuxhaven, the point of debarkation, to various cities in Germany. If at least three passengers are booked for an air trip from Cuxhaven, special planes will be flown from Cuxhaven to the following cities: Berlin, Bremen, Chemnitz, Dresden, Frankfurt, Hamburg, Halle, Leipzig, Hanover, Lubeck, Madgeburg and Muenchen.

A GERMAN Air Sport Association to be known as Der Deutsche Luftsport Verband has been formed under the auspices of the national aeronautics commission. Among constituent parts of the group are the National Socialists Flying Corps, the Rhoen-Rossitten Co. and the German Aeronautic Association.

BESIDES the night mail and freight service between Croydon, England, and Berlin, three new night services were to be inaugurated recently by Deutsche Luft Hansa. These include the Cologne-to-Frankfort service, Cologne to Malmo and Gothenburg via Hanover, and Cologne to Brussels and Paris.

(Continued on following page)

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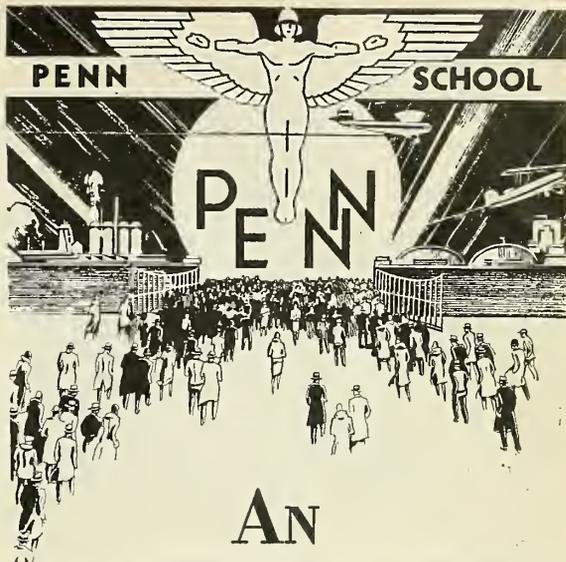
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(Continued from preceding page)

Great Britain

The India air mail which leaves London July 1 will end its journey at Calcutta instead of Karachi, it has been announced. Fifteen hundred miles will be added to the Imperial Airways network by the extension, and Calcutta will be brought within seven days of London. Once a week the airliners will make the trip in each direction. Arriving at Karachi in the early afternoon, they will go to Jodhpur for the night and land at Calcutta before nightfall the following day. In the reverse direction the liner is scheduled to leave Calcutta every Tuesday, carrying mail which will be landed in London on the following Monday.

On or about October 1 the second stage in the extension of the airway will be made with the opening of a service as far as Rangoon. Before the end of the year the service will probably be running regularly between Singapore and London, and by the end of March it is expected that the entire England-Australia airway will be in operation.

THE KING'S CUP race will be flown this year on July 8, in a series of heats, starting and finishing at Hatfield air-drome, Hertfordshire. Competitors who reach the final round will fly approximately 800 miles. Every airplane entered will be assumed by the handicappers to be capable of averaging at least 110 miles per hour over the course.

F. R. WALKER, the winner of last year's air race held under the auspices of the London *Morning Post*, again finished first June 5 in a race over a "secret" course under the sponsorship of the newspaper. The race was held over 466½ miles, divided into three laps, each of which started and finished at Heston airport, near London. Since none of the contestants knew his destination until the start of the race, the competition was chiefly a test of skill in navigation. Mr. Walker's plane was a Puss Moth, giving an average speed of 122½ miles per hour.

THE INTERNATIONAL Air Races which were to be held at Portsmouth on August 4, 5 and 7 have been postponed indefinitely.

DETAILED information has been recently released about the Handley Page "Heyford" night bombing biplane, now in production for the Royal Air Force.

Two Rolls-Royce supercharged 525-horsepower Kestrel water-cooled engines supply the power. They are installed in nacelles, the lines of which are merged with the upper wing. At a height of 13,000 feet the airplane reaches a maxi-

mum speed of more than 140 miles per hour, and it has a landing speed of less than 56 m.p.h. The plane is equipped with automatic wing tip slots to enable landing at low speeds.

The top of the fuselage is level with the surface of the upper wing, to make possible visibility equal to that given by monoplane construction. The engine exhaust pipes are led over the top wing, the final escape of the exhaust gases taking place not far behind the leading edge of the wing in an upward direction. Thus the planes act as a screen between the engine exhaust noise and listeners on the ground.

Refueling is done at the level of the lower wing by men standing on the ground. Bayonet joint pipes are snapped into connection with pipes in the lower wing, and the fuel gushes up under pressure into the fuel tanks, which are located in the top wing. At the same time the craft can be loaded with bombs, which are carried in the center section of the lower wing, and mechanics can be at work on the engines; part of the cowling of each engine can be let down to serve as a platform for them. The propeller shafts are so placed that the tips of the propeller blades are never less than eight feet from the ground, which means that the engines can safely be run while the bomb chamber is being loaded.

The plane has a span of only 75 feet, a length of 58 feet and a height of 20 feet, 6 inches, and can be easily housed in hangars of standard size. The comparatively small span also implies relatively small component parts.

The defensive military equipment of the Heyford consists of three screened machine gun emplacements, the screening allowing accurate fire to be maintained at high speeds. One gun is carried in a metal turret which may be let down when required beneath the fuselage. A second is located immediately above the turret, and the third is in the extreme nose of the fuselage and is manned by the gunner-bomber.

THE LAST of the fleet of eight four-engined monoplanes built by the Armstrong Whitworth concern for the African services of Imperial Airways left London for Cape Town recently. Powered by four Armstrong Siddeley "Serval" 340-horsepower air-cooled engines, the monoplanes have a maximum speed of 152 miles per hour and cruise normally on three-fifths of full power at 118 to 120 m.p.h. Test flights have shown that a plane of this type will maintain level flight on the power of only three engines up to 10,000 feet.

Seats are provided in the cabin for nine passengers, each of whom has a separately controllable electric light and ventilator. The chairs are specially designed for use in the tropics. Tables and

deep window ledges provide room for books, papers and other light articles. The glass windows are large but are not made to open; sufficient ventilation is obtainable from the ventilators.

HERBERT J. THOMAS has succeeded Sir John Siddeley as chairman of the Society of British Aircraft Constructors. Mr. Thomas, who is assistant managing director of The Bristol Aeroplane Co., Ltd., will be assisted by C. C. Walker, of The De Havilland Aircraft Co., Ltd., who was elected deputy chairman (aircraft), and by A. F. Sidgreaves, managing director of Rolls-Royce, Ltd., elected deputy chairman (engines).

KNOWN provisionally as the Vickers Supermarine "Southampton IV," a new flying boat being tested for the Royal Air Force owes much of its design to the twin-engined Southampton craft which have been standard equipment of Royal Air Force flying boat squadrons for the past seven years. However, the location of the two Rolls-Royce Kestrel engines in streamlined nacelles slung below the upper wings marks one difference. Also, the biplane wings are supported by a single pair of struts on either side of the fuselage instead of by two pairs, and every detail of wings, tail unit, power plant installation and fuselage is streamlined. An enclosed cockpit is provided for the pilots, a new feature in British military boats.

IT IS PLANNED to inaugurate an air taxi service this month with Liverpool as a base. The service, which will be established by the Blackpool and West Coast Air Service, will be available for all parts of the British Isles and is expected to be especially useful to business men who wish to expedite their journeys after crossing the Atlantic.

SIR ALAN COBHAM recently launched two tours by fleets of airplanes which during the next few months will have given displays in at least 320 towns in Great Britain and Ireland. Twenty-five planes make up Sir Alan's fleet, ranging in size from twin-engined 1,000-horsepower Handley Page biplanes to a tiny "Drone" featherplane driven by a six-horsepower motorcycle engine. Aerobatics, formation flights by the squadrons and parachute jumps will form part of the program of every display.

A NEWLY FORMED company, the Klemm Aeroplane Co., Ltd., has secured sole manufacturing and selling rights of all Klemm aircraft models for Great Britain, Ireland and British colonies and dominions, according to a recent announcement.

(Continued on following page)

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Aviation always has offered the better pay jobs to properly trained mechanics and pilots . . . men trained as *Lincoln* trains them. And such qualifications are demanded today more than ever! That's why *Lincoln* mechanics and pilots reap quicker success, and write like this:

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ACROPLANE at Camp Columbia, Cuban Army Aviation Base, Havana, Cuba.

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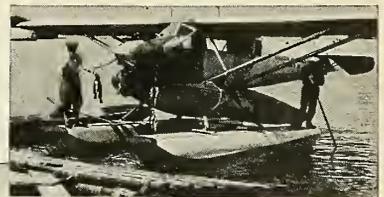


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BEACH PARTY—Not one, but a hundred beaches are within reach of the seaplane owner. Fly where the swimming is best and the party gayest.

EDO FLOATS

(Continued from preceding page)

Italy

Milan is to have a new airport which is to be about three times the size of the present commercial field, Taliedo. To be called Lambrate, the new airport will be more than four miles from the center of Milan, almost adjoining the present field and adjacent to the seaplane base. The landing area will be partly surrounded by canals, to prevent trespassing by pedestrians.

THE ITALIAN GOVERNMENT has agreed to accept for dispatch by the return flight of the Italian air cruise commanded by General Italo Balbo, Italian Minister for Aeronautics, unregistered letters weighing not over one-half ounce each for delivery in Newfoundland and Canada or Europe. The route to be followed on the return flight of the fliers has been announced as follows: Chicago, Ill.; New York, N. Y.; Shediac, New Brunswick; Shoal Harbor, Newfoundland; Valentia, Irish Free State; Rome, Italy.

Mexico

The aeronautical department of the Ministry of War and Marine has announced a decision to buy in the United States airplanes to replace those of the Army air service that are being retired because they are obsolete or are below efficiency and safety standards due to long and frequent use. The department desires ships of the latest design, equipped with machine guns and otherwise armed. It will send a commission to the United States during July to arrange for the purchase of such craft.

AN AVIATION AMBULANCE service for civilians, the first to be established in Mexico, will be inaugurated soon between Villahermosa, capital of Tabasco state, and towns in that commonwealth which are industrial centers by the Compañía Aeronautical del Sur, according to its general manager, J. Hans Mattess.

A SPECIAL round-trip fare has been established between El Paso, Tex., and Mexico City by the Compañía Mexicana de Aerovias Centrales, S. A., from June 1 to August 15, for American university and college instructors and students who

travel to the Mexican capital for the summer school of the University of Mexico.

WALTER T. VARNEY and associates have been granted a concession for one year, starting July 19, for the operation of a mail, passenger and express weekly aviation service between Merida, capital of Yucatan state, and Payo Obispo and Cozumel, according to the aviation department of the Ministry of Communications and Public Works. Two eight-passenger Lockheed Orion planes will be used.

LARGE AREAS of central-western Mexico will soon have a regular passenger and mail aviation service as the result of a concession, granted to Alfred M. Williams and Daniel F. Fort, Americans, by the Ministry of Communications and Public Works, to operate on a trial basis two routes out of Guadalajara. One of these services will be from Guadalajara to Ayutla, a Pacific port, with stops at Tepic, Santiago Ixcuintla, San Blas, Puerto Vallarata, Mascota and Autlan. The other will be from Guadalajara to Manzanillo, with stops at Sayula, Ciudad Guzman and Colima City. These services are scheduled to start July 1 and are to be conducted on a trial basis for two months.

A RADIO meteorological service for use by Army aviators has been established by the Ministry of War and Marine. Radio-telegraphic stations throughout the country now supply the Ministry data every hour concerning weather conditions in their territory, and the Ministry is relaying this information to the military fliers.

RALPH BECKMAN, owner of a large ranch near Parral, Chihuahua, has applied for a concession to establish a local aviation service between his farm and the mining camps of San Francisco del Oro and Santa Barbara, Chihuahua. He has established a landing field on his ranch.

THE MINISTRY of Communications and Public Works has announced that municipal governments throughout Mexico are cooperating with its proposition to place markers in their localities giv-

ing the national air chart letter and number of their towns. These markers, painted in easily discernible colors, are being placed on the roofs of conspicuous buildings and fields of the communities and will enable aviators to keep close to their routes, since each marker corresponds to the air chart with which all fliers have been provided.

THE MINISTRY of War and Marine has made arrangements for the establishment in Mexico City of Mexico's first military aviation museum. Among exhibits will be trophies awarded national fliers for making exploration tours of their country and the first plane that was completely constructed in Mexico.

A SEMI-WEEKLY seaplane passenger, mail and express service has been resumed between Mazatlan and La Paz by the Compañía de Transportes Aereos del Pacifico, S. A., of which W. R. Ayers, American civilian flier, is director. The planes cover the 375-mile route in 2½ hours, as compared with the three days required by boat.

Spain

A new department, the Direction General of Aeronautics, has been organized to have control over various Spanish aeronautical divisions. Dependent upon the Council of Ministers, the department will assume the functions formerly exercised by the direction-general of civil aeronautics, the bureau of military aviation of the War Department, the bureau of naval aeronautics of the Navy Department and the national meteorological service formerly under the geographic institute. Among dependent offices of the new department will be a secretarial office, superior bureau of air forces, bureau of instructions, section of air traffic, section of technical and industrial aeronautical services, administration of the corresponding budget and other functions.

An air armada, the air corps of air defense and the air corps for cooperation with the Army and Navy will compose the Spanish air forces, under the direct command of a superior chief of the aid forces.

A general school of aeronautics for the training of Army, Navy and civil personnel also has been created.

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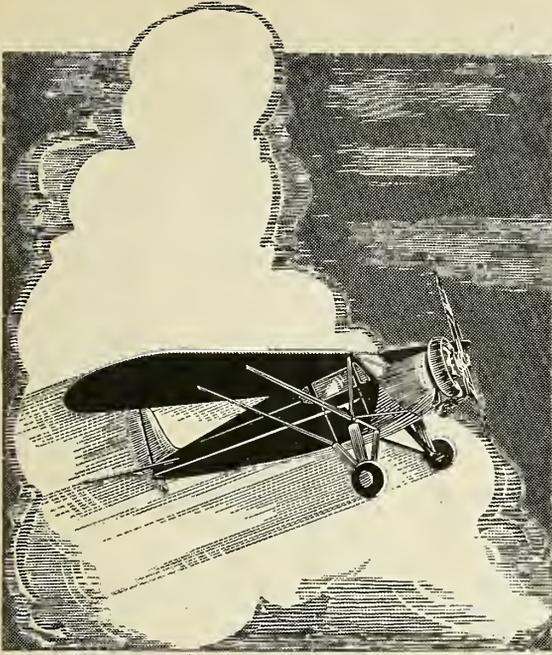
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The Fairchild "22" is America's leading 2-place open cockpit plane. For sport or training use it will perform splendidly at an exceptionally low operating cost with either the American Cirrus 95 h.p. or the Menasco C-4 125 h.p. engine. The 1933 models are fully equipped throughout with ball bearings and the landing gear fittings are equipped with replaceable bushings, thus assuring minimum maintenance on all operating parts for the life of the plane.

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Here is a large, fine, 2-place cabin plane, providing comfort and visibility heretofore not obtainable in a ship of this type. You will find a new luxury in this wide, roomy cabin where pilot and passenger sit side-by-side in perfect comfort. Performance is remarkable: Fairchild ships are noted for their responsiveness and capability. The "24"—like the "22"—is not only inexpensive to operate and maintain, but inexpensive in first cost as well.

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CAN YOU SPARE A FEW THOUSAND DOLLARS?

(Continued from page 17)

uct, the result would be beneficial to an industry in which very little sales exploration is in evidence today.

From the foregoing it would appear that manufacturers who have been supplying the army, the navy, the air mail, the passenger lines—concededly the cream of the business—may now with prudence look beyond the boundaries of their present markets. Not that there is any likelihood that these major sources of patronage will dry up. Simply that events now shaping themselves may place limitations, if only for the time being, on the volume of contract business available.

The Job That Lies Ahead

If, then, the outlook for contract business is not particularly bright at the moment, and the market for planes for private and business use has almost been abandoned, let us concede right here and now that the aircraft business is DEFLATED. Deflated in immediate and potential markets, in every operation and activity, in money resources, in facilities, in personnel. Concede the worst and get it over with. Then remember this:

The industry survives.

It has ONE JOB and only one.

That job is to produce airplanes and to find markets for them.

Those who are still engaged in the industry may well forget everything else that has happened or that can happen.

If you can produce suitable planes you can find a way to sell them. Proof: You are producing planes today and, against the greatest odds you are selling some. In one recent week one manufacturer sold two planes; another sold one; another, three. Three manufacturers, six planes sold in one week. All to individual buyers. Not a large scale business, it is true. But proof that there is still some business around, even now.

If six purchasers can be found for private and commercial airplanes, six more can be found. Oh, yes they can in a country inhabited by 125,000,000 people and supporting more than 2,000,000 business concerns, of which 12,000 are capitalized at \$200,000 and over! So add six more planes to your quota. And keep on going from there. Concede the deflation. Concede the scarcity of ready purchasers. Concede the toughness of the job. Concede it and forget it. Heads up! One job, one resolve, one purpose in mind—

Sell Another Airplane

Courage and determination will win half the battle. Right methods will win the other half.

Anyone acquainted with the traditional

courage of those in aviation will have no misgivings that the will to overcome any obstacle is unquenchable amongst the brethren. That goes double for the present survivors.

New Sales Methods Must Be Found

As to the most effective methods to follow in finding and selling prospective purchasers, much can be learned in a searching study of the marketing methods that have been developed in other fields. Throughout three years of atonement for past mistakes business has devised new tools for the salesmen, new technique in sales procedure, new solutions for problems that arise when the buyer holds all the trump cards. Aviation will not fail to profit by these results which have been achieved through earnest study, countless tests and substantial expenditures in time and money.

To supplement the efforts of the individual manufacturer, a general survey has been conducted for some weeks past with the object of assembling a fund of this sales material and to determine those methods which might be applied to the selling of aircraft. Much of practical value has already been brought to light. In further articles in AERO DIGEST these findings will be reported and it is hoped that they may be of assistance to manufacturers who are themselves diligently searching for more effective sales methods. Every effort will be made to provide the most practical material. There will be no "organization charts" or other stuffy text book exhibits. The ground to be covered will include the following:

1. Attitude of the public toward flying and toward plane ownership; buying motives; psychology.
2. The product; general definition; major classifications; specific types; performance; range of service; a complete and honest delineation of the economics and advantages of plane ownership.
3. The market; survey of prospective customers—private, business, commercial, civic—a comprehensive picture.
4. Selling; plans and policies; quotas; territories; selling points; service; recruiting, training and supervision of salesmen; sales procedure; display of product; demonstrations.
5. Sales promotion; building a prospect list; appeals; group talks; group selling; advertising; copy testing; media; follow-up; appropriations; direct mail activities; catalogues and supplementary literature; publicity; showmanship.

Now that sounds like a pretty tight program and we hasten to add that no business efficiency expert or college professor will be allowed to turn it into an academic ritual. The "agenda," as they say in League of Nations circles—"work program" to you—will be carried on in an

informal discussion. It should not make hard reading even in hot weather. Authentic and up-to-the-minute information and suggestions will be given with due regard to their immediate application to the individual problem. To this end, the full collaboration by executives within the industry has been assured.

A New Deal for Aviation

In addition to the prescribed program some original and far-reaching proposals growing out of this study will be offered. It is hoped that they will prove to be at least thought-provoking to those in the industry who will not shrink from something in the nature of a New Deal for Aviation.

The keys to all success are ideas and hard work. That was true when Balzac said it and it is true today. Aviation will not fail to recognize and turn to good account the opportunities that lie ahead. With its preferred markets in military, air mail and transport contracts not as lush in prospect as in the past, it will bestir itself to create new and even greater markets. It is the purpose of these articles to give impetus and direction to so worthy a cause.

The message, then, for today is this. Business recovery is well under way. The country will rapidly be in a better position to absorb an increased output in private and commercial airplanes. The job from this time forward is to *sell another airplane*. Another airplane can always be sold. Not by salesmen who in effect stand on the street corner, hat in hand, and ask, "Mister, would you like to buy an airplane cheap?" Not by waiting for great fortunes to rebuild, or business surpluses to overflow (there will be very little "sugar" money in sight). But by SALESMANSHIP, intelligently directed, effectively and untiringly performed. Just what that is we shall try to find out.

AIR—HOT AND OTHERWISE

(Continued from page 13)

can do this only by being made to recognize where air transport intends to go, and is going.

We congratulate Tom Morgan upon his decisive action. And we warn him of a specific difficulty ahead. Our industry has a mighty poor record for unselfish cooperation for the good of the whole flying idea. It will be a new and difficult thing for some men in the industry to think and act cooperatively and unselfishly. But there is a further difficulty, for it is hard for many of us to think that the trade of aeronautics is at last really to be represented by the Aeronautical Chamber of Commerce. An important step has been made toward this New Deal by the reorganization of the Chamber. And now that this is done, the next move is up to each individual working in the field of aeronautics.

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The cigars will be packed in an economical metal container not banded, but will contain the same high quality, long Havana filler, Connecticut Shade Wrapper and Broadleaf binder used in the popular Almendares brand and in all ways, except its finish and packing, be the same as the 15c. size and shape. "ALMENDARES EXCEPTIONALE."

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If you don't get—in your own opinion—at least \$3.75 worth of supreme smoking pleasure from this \$1.00 trial offer, let us know and your money will be immediately refunded—no delay, no red tape—and the smokes are on us. Reference: Dun-Bradstreet or any bank in the U. S. or Cuba.

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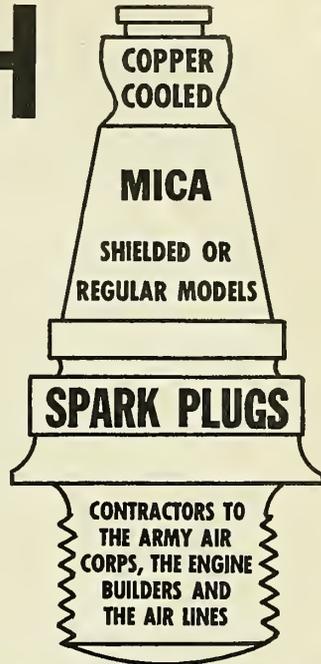
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THE INFLUENCE OF RACING

(Continued from page 39)

fastened to the stabilizer and held against the side of the fuselage by spring tension and traveled up and down with the stabilizer during adjustment.

The stabilizer control was screw-type, operated by a wheel directly in front of and at right angles to the seat, within easy reach of the pilot, with his eyes still on the course. The stabilizer had 15° of travel, being hinged about the front spar. In actual practice, we found that no adjustment was necessary for landing, take-off, or flying, after the proper adjustment was once made. The elevators were controlled by cables from the stick to a bell crank mounted directly below the stabilizer front spar, thence to the elevators by a push-pull tube with ball-bearing joints.

The control stick was unusually long and geared down in such a way as to make a small movement of the control surfaces with a large movement of the stick. The control proved to be light and sensitive.

The tail surfaces of the transport job are of the same general structure, the same general proportions and operate in the same manner as proved on the racing job, the main departure being in that a control column for ease of handling the larger surfaces is being used in place of the stick.

The rudder of the racer was somewhat different from the usual in rudder construction and design. It was merely a movable end on the streamline fuselage. From previous experience it was found that a thin rudder acting between the converging streams of air on each side of the fuselage was too sensitive at high speeds if of sufficient size for control at stalling speed. The rudder is nearly 12 inches thick at the hinge-line and the sides of the rudder are therefore nearly parallel to the flow of the air stream on each side. This makes the rudder action soft at high speeds while of sufficient area for complete control at stalling speeds. The actual operation proved sensitivity to be more pronounced at stalling speeds than at high speeds.

The same system of rudder control is being used in the transport.

Engine Cowling

The engine cowling regardless of type or characteristics should permit sufficient cooling of the engine cylinder heads and barrels. It should also be so constructed as to allow smooth air flow around the fuselage and have as large an anti-drag component as possible. At this point, it might be said that a large number of tests to determine the best chord length, angle to the thrust line, and fore-and-aft position could be made for the best combination for this

particular model. Time, however, was the limiting factor and experience dictated the general lines to be followed for the design of the engine cowling. However, three types were tested on the wind-tunnel model and drag values were obtained for each type—single and double camber cowlings and one designed to give the nose of the fuselage a streamline appearance; this type was not constructed to function on the anti-drag principle.

Results of these tests showed the single camber cowl to be better than the others as far as drag is concerned. It was believed that cooling would be sufficient under all conditions in which the airplane was to be flown. This cowl was adopted and, it might be added, the cooling was found adequate and the flow of air behind the cowl and along the fuselage was excellent. This fact is attested to by the exhaust smudge on the body.

From past experience we expected trouble from the N. A. C. A. cowling, and governed the design accordingly, but in spite of our precaution the cowling persisted in sliding forward. It was held by its leading edge (supposedly the strongest part of the cowling) by turn-buckles. This leading edge was reinforced by a half inch tubing rolled into the cowling. In spite of the extra strength of this arrangement, the tendency of the cowling to move forward was so great as to roll the entire leading edge inward, tending to run the entire cowling wrong side out. We found it necessary to reinforce the nine points of attachment as well as to build up ribs inside the cowling at this point, to hold them from falling back.

The only difference in the cowling of the commercial job is that it is designed to take slightly lower loads and, for the sake of the serviceability, to be more easily detachable than was necessary on the racing job.

The Landing Gear

The landing gear of the racer was a rather conventional type of fork and shock absorber, having an Aerol strut with five inches travel, working on air and oil.

The chassis structure of this landing gear formed the flying structure to which the streamline wires were attached. The maximum loads in this structure from landing and the maximum loads in flying were, of course, not applied at the same time, therefore, this structure did double duty.

Warner Aircraft wheels and brakes were actuated by the system of full back on the stick with directional control by the rudder pedals. The 6.50-10 Goodrich tires were enclosed in boots which were attached to the wheel forks in such a way that they traveled straight up and down with the wheel, keeping in line of flight and keeping the wheel and tire

covered to a maximum in all positions. The Goodrich sponge rubber tail wheel was used with a three-inch oleo type shock absorber, the whole unit being contained within the rudder. The tail wheel was thus controlled by the rudder, giving positive ground control when taxiing or landing. The wheel was held in line of the rudder by a cam action which was releasable, allowing the wheel to swivel 360° on its vertical axis. This made the ship easy to handle in the hangar.

This type of landing gear proved not only to be of very low drag, but had fine shock absorbing and ground handling qualities, as well as the ability to withstand a terrific load in rough landings at high speed on rough fields.

This same type of landing gear is being used in the transport with the exception that it is not wire braced, but the V structure is cantilever within itself. As far as side loads are concerned, the same type of boot and attachments, etc., are used throughout. The wheels and brakes are Auto Fan and Bearing Co., the latter being actuated by a hydraulic control device of our own design and manufacture, allowing the instant removal of the wheels for repairs without the necessity of disconnecting hydraulic lines or other mechanism.

The Cockpit

The main reason for situating the cockpit of the racer just ahead of the stabilizer was visibility, inasmuch as the fuselage at this point had changed from the huge circle, 61 inches in diameter at the wing butts, to an ellipse 56 inches deep, and slightly wider than the pilot's shoulders at the top longeron. This allowed the use of a small cabin which streamlines well into the fin, and at the same time allowed the pilot to look down at the side and around the fuselage at the best angle. The windshield was three-piece "shatterproof" glass. The covering from the windshield back to the head rest was Fibreloid, secured through catches making this cover removable by the movement of a small lever on the left side. This allowed the pilot to release the cover in an emergency and exit through the top, or in case of oiling up the windshield, allowed him to release this cover, and with the windshield fixed in place, fly the ship like an ordinary open cockpit job.

Access to and from the cockpit was by means of a door in the side of the fuselage. By means of a lever just ahead of the door, the hinge pins could be withdrawn, and the door itself instantly released. By this means, the pilot, in case of emergency could put his head between his knees, release the belt, and roll over, instantly being clear of everything with the exception of the stabilizer, which, having no bracing of any kind and being right at the door, could not catch or in-

(Continued on following page)



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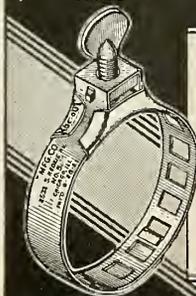
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(Continued from preceding page)

jure the pilot. This gives the pilot two means of exit in case of emergency. The pilot's seat was adjustable, by means of a wheel on the left hand side, allowing the pilot to adjust himself to the most comfortable position for visibility.

The instrument board was fully equipped with navigation and flight instruments. A Lewis Engineering Company thermocouple with selector switch was installed, with the Fahrenheit gauge as near as possible in line with the pilot's vision during a flight, where he can easily note the cylinder head temperatures.

Ventilation of the cockpit was provided by a three-inch flexible tube, bringing fresh air from a scoop just forward of the cylinders on the engine. This stream of fresh air at high velocity is controlled by a knob on the instrument board which forces a deflector plate against the tube outlet, closing off or on, and deflects the air at will. The ventilator behind the pilot's head allowed exit of the air and brings circulation of fresh air to the pilot's face without drafts. The air is exhausted through the joint of the fuselage and rudder.

Two gasoline tanks of eighty gallon capacity each were provided, with a shut-off valve at the extreme lower left of the instrument board, allowing either or both tanks, or the twenty-five-gallon reserve to be used. Oil was carried in a twenty-gallon flat corrugated tank installed in the engine compartment.

A specially designed throttle, spark, and altitude control, having large rigid knobs and individual friction adjustments was used. This control unit consisted of a lever controlling the Hamilton Standard controllable pitch propeller and also the control for the Smith controllable propeller. Thus, engine controls were in one strong, neat appearing and accessible unit, requiring the use of the left hand only and not necessitating the shift of hands on the stick for any operation.

The throttle was of such rigid construction as to allow the pilot to use it as a hand to steady himself while flying along at high speed in rough air. From the gas tank section back, the fuselage turtle deck is of plywood construction, the sides being built up of fairing and covered with fabric.

Disappearing handles were provided for use in lifting the tail for any purpose, as was also a rest contained within the fuselage, under which a "horse" could be placed without damaging the fairing.

Two hand holes with spring covers opening inward were provided on the sides of the windshield, allowing the pilot to clean the windshield in flight. These holes were ordinarily kept covered to exclude any exhaust gases.

The problem of cockpit or cabin arrangement of the commercial job is some-

what different. In the transport we have sacrificed a little frontal area to allow the pilot and co-pilot as near perfect vision as possible, both in the air and on the ground. Commercial jobs are often required to operate from heavily congested airports where visibility while taxiing is of the utmost importance.

The control system is so designed that the pilot may throw over the control column to the co-pilot, automatically bringing the rudder pedals and throttle control into action in that seat. Taking the controls back again automatically eliminates the pedals and throttle, allowing that seat to be used by an unlicensed passenger and still be within the Department of Commerce regulations.

The instruments are complete for cross-country and blind flying. This equipment includes artificial horizon, directional gyro, turn-and-bank and rate-of-climb indicators, as well as radio.

The cabin is of unusual dimensions for a ship of this size, allowing freedom of movement for the passengers. The four forward seats swivel, allowing passengers to face one another when desired, to converse, play cards, etc., in comfort.

All of the windows are permanently sealed closed, this being a part of the sound-proofing equipment to make the cabin as quiet as possible.

Ventilation is by means of a forced draft through air ducts which may be controlled at the will of the passengers.

A large baggage compartment is provided under the floor, access to which may be had either from the cabin or from the outside. A hat rack and hand rail is provided above the seats.

This ship is fully equipped with night flying equipment, including reading lights over the seats, which together with the window shades and ventilating system may be controlled at the will of each passenger.

General

In the racer, exhaust gases were deflected to the proper points within the N. A. C. A. cowling by special stacks and allowed to mix with the air passing through the engine and out the rear edge, thus eliminating the possibility of disturbing the air flow around the outside of the cowl.

On the transport it is necessary to eliminate exhaust gases, the consequent smoke and noise, by the use of an exhaust manifold carrying these gases down and exhausting beneath the fuselage.

Owing to the bulkiness of the fuselage on both the racing ship and transport, the first impression gives one the idea that the ship is short coupled, as well as having extremely small tail surfaces, which, however, is an optical illusion, as actually the tail area and the distance from the leading edge of the wing to the elevator hinges is greater than used on many of

our previous models, including the 1931 racer. The tail surface area in relation to the wing area is greater than standard practice, being 20.75% in the racer, while on the transport job this amounts to 18.25%.

The racing ship was designed with a load factor of 12 at high angle of attack with the exception of the tail surfaces, whose load factors were considerably higher.

On the commercial job the load factors are 7 at high angle of attack with the exception of the tail surfaces, which are slightly higher. The reason for the difference in load factors is because of the difference in the weight horsepower ratio, as well as the maneuverability. Also, the size of the racer allows for quicker maneuverability and the ship is liable to be subjected to terrific loads due to these maneuvers, or experienced when running into the wash of another ship during a race or flying at high speeds through rough air.

Proof of the soundness of this design by actual performance is ample reason for using such features of aerodynamic and structural design in our commercial jobs, and the game of airplane racing today has the same bearing on the commercial aircraft industry of tomorrow that automobile racing has always had on the following automotive industry. Race courses are laboratories and proving grounds of new and better ideas, and pave the way for efficiency and safety in the airplane and automobile of the future.

MODEL C-8 TRANSPORT

Specifications

Wing span	45 feet
Length	33 feet 9 inches
Height	11 feet 6 inches
Gross wing area.....	390 square feet
Net wing area.....	335 square feet
Root chord	132 inches
Wheel tread	120 inches
Max. fuselage cross-section.....	41 sq. ft.
Wing aspect ratio.....	5.2 to 1
Incidence	2.5 degrees
Dihedral	4.5 degrees
Weight empty	3925 pounds
Gross weight	7000 pounds
Total gas capacity	200 gallons

Estimated Performances

High speed	225 miles per hour
Cruising speed	190 miles per hour
Landing speed (with flaps).....	50 m. per hr.
Rate of climb	1100 feet per minute
Endurance, full speed.....	3.08 hours
Endurance, cruising	4.5 hours
Range, full throttle	695 miles
Range, cruising	850 miles

SUPERSPORTSTER R-1

Specifications

Wing span	25 feet
Length	17 feet 8 inches
Height	8 feet 2 inches
Net wing area	75 square feet
Root chord	53 inches
Wheel tread	76 inches
Max. fuselage diameter.....	61 inches
Aspect ratio	6.1 to 1
Incidence	2.5 degrees

(Continued on following page)

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**HAPPY
LANDINGS!**

(Continued from preceding page)

Dihedral	4.5 degrees
Weight empty	1840 pounds
Racing gross wt. (50 gals.).....	2415 pounds
Maximum gross weight.....	3075 pounds
Total fuel capacity	160 gallons

Performances

High speed	294.38 miles per hour
Cruising speed	260 miles per hour
Landing speed (estimated).....	.90 m. per hour
Rate of climb.....	6100 feet per minute
Endurance, full throttle.....	2.14 hours
Endurance, cruising speed.....	3.56 hours
Range, full throttle.....	630 miles
Range, cruising speed.....	925 miles

PERSONAIRLITIES

(Continued from page 28)

zen, fully qualified to pay taxes and complain about Prohibition, along with the rest of us. As a patriotic gesture he coined the phrase, "If you don't like this country, why don't you go back to Brooklyn?" For this he was awarded the Double Cross of C. M. Keys, with palms, 2d Degree. But that's another story.

Recognizing at a glance that the only way to get anywhere is to have a company and engage in Business (this was in 1921, before Depressions had been discovered by a fellow called Babson and other names), Seversky organized the Seversky Aero Corp. for the development of his many valuable inventions and became president and general manager. His aircraft patents were purchased in 1931 by the Seversky Aircraft Corp., of which he is the founder and president. This company has recently completed an amphibian plane designed by Major Seversky and which he will fly, on land gear, in the Bendix Trophy Race from New York to Los Angeles. He is a pilot of rare skill, especially expert in aerobatics, has taken part in many races and given exhibitions at the National Air Races. He has over 6,000 hours and a charming American wife named Evelyn, who is also a competent pilot.

A BINGHAM IN THE WOODPILE

(Continued from page 14)

and to force them not to attend unsanctioned meets which paid no tribute to the N. A. A.'s racketeering demands.

It must be obvious to every reader that if I merely desired to write an article to follow up last month's discussion of Hiram Bingham's strange policies, all that I needed to do was to let Mr. Bingham and his Contest Committee make their own mistakes, and then write about them. On the contrary, however, my chief interest is to encourage *fair* and *just* air racing. Therefore, as a member of the Advisory Boards of both the Chicago and the Los Angeles groups, I urged that Major Schroeder and the Contest Committee should agree to some compromise in order that sanctioned races of a practically non-competitive character

could be flown in Chicago on July 1-4, the dates of the national races in Los Angeles. Three months ago I had urged Major Schroeder to change his date to an earlier or a later one, and thus avoid all conflict with the sanctioned Los Angeles meet. As he had been prevented from doing this—by conflicting opinion within his own group—I then approved and recommended his later plan to run several A. T. C. races and free-for-all races for engine classifications for which the National Air Races had not provided events.

Of course, it could be argued that even such events in Chicago would constitute competition, of a sort, for the sanctioned meet in Los Angeles. But, as I pointed out in letters and by telephone to William P. MacCracken, Jr., Chairman of the Contest Committee, the fact of an air race promoter having functioned on the committee that sanctioned his own races had so undermined the ethical standing of the committee that some concession should be made, in order to erase the blot that smirched the committee's reputation. Thus I made clear that while my stand toward Hiram Bingham as N. A. A. President was uncompromising, my attitude toward the Contest Committee as a whole was one of friendly helpfulness. My suggestion was favorably received by Mr. MacCracken, who promised me by telephone to do all that he could to clear up an unfortunate situation. He voiced his objections to the tentative prize money offered, upon which I assured him that I would advise Major Schroeder to lower all prize money to a non-competitive point that would be agreeable to the N. A. A. This I did.

In a letter dated June 2, Major Schroeder writes: "I did not get a sanction . . . the Committee voted unanimously not to give me a sanction because it was considered a competitive nature, and in competition with the races in California on the same dates. . . . I offered to lower the prize money in my free-for-all races, and that seemed to be agreeable to the Committee. . . . During the time I was before the Committee, Bingham tried to make it very disagreeable for me by questioning me before the Committee in regard to the open letter which we sent out to pilots in the industry. He did it, of course, to embarrass me and to belittle our efforts to obtain a sanction."

And what constituted the Contest Committee at that meeting? Those present were MacCracken, Lewis, Bingham, Barnaby, Chandler, Cleveland, Du Pont, Kilner, Enyart—the rest were represented by proxies. Those proxies represented men who permitted themselves to be used as rubber stamps by Hiram Bingham; men who sanctioned *two* major air meets *promoted by a member of the Contest Committee*, and refused sanction to even *one* event *promoted by a competitor of*

that Committee member. In view of this, I feel that the position of the entire Contest Committee now is quite untenable on any ethical grounds.

If after investigation of these charges the F. A. I. fails to request the resignation of this largely rubber stamp Contest Committee, and fails to reverse their atrocious rulings, what can the members do to reinstate themselves in the good, or at least tolerant, opinion of aviation? If the Chicago July 1-4 races are flown as scheduled, and if the three-year penalty is imposed upon competing pilots, as Mr. Bingham's ruling says that it will be, then what can this too complacent Contest Committee do after it has passed Mr. Bingham's three-year sentence of starvation upon American racing pilots? I suggest that every member should take his duties seriously enough to read the F. A. I. rules in an effort to find a way out. If they will study Rule 207, Remission of Sentence, they will find that: "The National Aeronautical Association shall have the right to remit the unexpired period of a sentence of suspension or to remove disqualification on the conditions which it may determine." Let them ponder that rule with contrite and humble hearts, praying for wisdom to guide them through this period of travail that they have brought upon themselves.

Majority of Members Honorable

It is not my purpose to suggest that the entire Contest Committee was actuated by corrupt motives. On the contrary, I know that the majority of the members are honorable and fair-minded men. It is my opinion that through the exercise of faulty judgment, or the failure to use any commendable judgment whatever, they found themselves in a difficult position, unable to justify their having permitted an air race promoter to belong to their committee and thus sit in the position of judge on his own and his competitor's race promotions.

My Censure to the Committee

As Hiram Bingham has been censured and condemned by his fellow-Senators, I think that it is quite in order for me to paraphrase that Senatorial censure and apply it, as my personal censure, to Bingham's Contest Committee itself, in these words:

Resolved, That the action of the Contest Committee of Hiram Bingham's N. A. A., while not the result of corrupt motives on the part of the Contest Committee (as a whole), yet is CONTRARY TO GOOD MORALS and AERONAUTICAL ETHICS and TENDS TO BRING THE CONTEST COMMITTEE and the NATIONAL AERONAUTIC ASSOCIATION INTO DISHONOR AND DISREPUTE, and SUCH CONDUCT IS HEREBY CONDEMNED.

ADVERTISERS' LITERATURE

THIS service is for the convenience of those who are in the market for any of the products or facilities advertised in this issue. Read carefully the advertising of the items listed below in which you are interested, to determine whether the information offered is what you need. When filling out the coupon be sure to mention the company with which you are associated, and your position.

1. RCA-Victor offers aircraft owners and operators complete data on their radio transmitters and receivers, as well as special aircraft radio equipment. (Page 1)

2. Literature of the Ryan School of Aeronautics, San Diego, Calif., tells about their various flying and ground courses, special equipment, tuition, etc. (Page 2)

3. The Waco Aircraft Co. has a booklet describing the three new Wacos for 1933. Operators, private owners and potential owners are invited to write for it. (Page 3)

4. Airline personnel, commercial operators, private fliers, dealers, etc., will be interested in the literature describing B. G. Spark Plugs. (Page 4)

5. Stinson invites prospective plane purchasers to write for the latest issue of Stinson Plane Talk, which describes the new Reliant. (Page 5)

6. Kendall guarantees clean oil by selling it in sealed cans. Write, if you are not certain of where it may be purchased. (Page 6)

7. Low prices still prevail at the Dallas school. Write for literature describing the various courses, prices, etc. (Page 7)

8. For airline operators, Douglas has a booklet describing three new high speed amphibian models developed originally for military purposes. (Page 8)

9. Write for the details of Spartan flight and ground courses and the several Spartan "free" offers. (Page 9)

10. Texaco describes its various aviation products—gasoline, oil, grease, asphalt products. (Page 10)

11. Detailed specifications of the new Boeing 247 transport are available to airline executives. (Page 27)

12. The Boeing School Bulletin tells about flying, ground and administrative courses beginning with the next enrollment. (Page 65)

13. Pacific Airmotive Corp., Calif., are sales and service representatives for numerous aircraft products. (Page 61)

14. Complete details of pilots' and mechanics' courses are available from the Penn School of Aviation. (Page 61)

15. Aircraft manufacturers, engineers, etc., are invited to write for P. & W.'s literature describing Wasp and Hornet engines. (Back Cover)

16. Nicholas-Beazley's prices have been reduced. Pilots, mechanics and manufacturers are invited to write for Catalog "K". (Page 67)

17. Schools and airports will be interested in the Acroplane for training and "joy hops". (Page 63)

18. Manufacturers of high speed transports and airline operators will be interested in Wright's literature describing the 700-h.p., 14-cylinder Whirlwind. (Second Cover)

19. Berry Bros' literature describes for manufacturers, repair stations, plane operators and owners, their line of paints, varnishes, enamels and lacquer. (Page 71)

20. Wittek hose clamps are described in a booklet for aircraft and engine manufacturers, airline bases, mechanics, etc. (Page 69)

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1,000 tires, 26 x 4, 26 x 5, 30 x 5, 32 x 6, 36 x 8,
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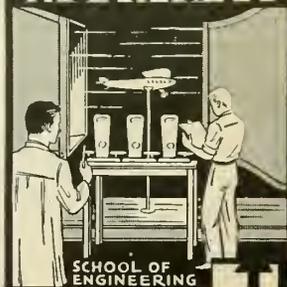
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QXX-6 Challenger C-2 in good shape. Will sell cheap or trade on a 2-place Aeronca. Remsen, 769 Hunterdon Street, Newark, New Jersey.

WACO TEN: OXX-6, Scintilla mags, Miller overhead, Goodyear Airwheels, standard instruments; fuselage black, wings red; licensed June 1934. Price \$600. J. Warren, Hangar 6, Floyd Bennett Airport, Brooklyn, New York.

SPARTAN C-3: Licensed; navigation lights, compass, bank indicator, etc.; covering A-1, \$600. Will accept plane needing overhaul or crack-up on trade. Frank D. Bowman, Jr., Berino, N. M.

AERONCA, 2-passenger, winter enclosure, practically new. Equipped with Olex landing gear, air wheels, fully equipped with instruments. Privately owned. J. L. Littleton, Brunswick, Ohio.

TRAVEL AIR: J6-5. Model E-4000. Three-place. Recently reconditioned throughout and motor overhauled. Standard Steel prop, navigation lights, plenty of instruments for blind flying, brakes, etc. Finished international orange and black. Sell or trade. Central Air Service, Battle Creek, Mich.

KINNER DAVIS: Excellent condition, license expires April 1934; air speed indicator, semi-air wheels, new propeller, \$800. Irene Hartley, Dragoon Trail, South Bend, Indiana.

MUST SELL IMMEDIATELY: NC Eaglerock, Hisso 180, Bendix brakes; Robin OX-5, Scintilla, Millerized, steel prop, just licensed. Three-place Swallow OX-5, completely overhauled and recovered. Just relicensed. Wire offers. Ralph Kenyon, Newtonville, Massachusetts.

DAVIS MONOPLANE: LeBlond 60. Licensed January 1934; 30 hours since motor overhaul; fuselage recovered. \$785. William Ziegler, 1027 Fifteenth Ave., East Moline, Illinois.

STINSON JR.: 4-place, Warner 110 Scarah motor, \$975 cash. Practically new motor, 190 honest hours. Privately flown, kept in hangar. Karl Fantle, Yankton, South Dakota.

STINSON J-5: Six place. Just relicensed; \$975 Travel Air J-6 175; Motor major overhauled; \$1,150 Travel Air Challenger; Fuselage just recovered; \$1,150 Cessna J-6 330; Flaps, landing lights, etc.; \$1,550. Florida Skyways, Box 2772, Miami, Florida.

STINSON JR.: Completely overhauled, refinished and licensed. Plenty extras; large compass, air speed, turn and bank, cabin heater, navigation lights, reclining adjustable chair; equipped for landing lights and flares; interior and exterior in beautiful condition. \$1,175 if sold quickly. Charles Hill, 544 Shirley Avenue, Buffalo, New York.

PITCAIRN PA-5: J-5 Blind flight equipment, dual instruments, Radio and dual mikes, Night flying. Full Airwheels. Pressure Pyrene. Special cowling. Excellent appearance and condition. AERO DIGEST, Box 1557.

GIPLY MOTH BIPLANE: \$650. Licensed, motor just overhauled, semi-airwheels, compass, air speed. OX-5 ships, \$195-\$235. LeBlond-Inland monoplanes, \$400. One-place monoplane, \$150. Everything flyaway. Allison Airplane Co., Lawrence, Kansas.

FOR SALE: Warner-powered Waco F, just relicensed and in good condition throughout. Used privately by transport pilot and has had only 720 hours. Will deliver anywhere for expenses. A bargain at \$1500. Wire or write B. S. Stewart, Municipal Airport, Austin, Texas.

ARROW SPORT: Licensed in good condition; LeBlond 60, \$475, cash only. Real bargain H. D. Morris, Clifton Forge, Virginia.

FOR SALE: Licensed OX-5-powered Swallow biplane; 150 hours. Always hangared. Excellent condition. Price \$500. Inquire, Anton Brotz, Sr., Ridge Court, Kohler, Wisconsin.

FOR SALE: Straight-winged Waco J-5. Pneumatic struts, Airwheels. Turn and bank and air speed indicators. Irving parachute. No flying since major overhaul. Total time, 420 hours. Price \$1250 complete. Inquire of Charles E. Holzer, Twin City Airport, Gallipolis, Ohio.

AVIAN CIRRUSS: \$600. Waco Taperwing J-5, \$1,600. Challenger J6-5, \$1,200. OX-5 Challenger, \$450. Moth Gipsy, \$900. Kitty Hawk Kinner, \$950. Write R. F. Walton, Box 615, New Canaan, Connecticut.

AMERICAN EAGLE: Model 129, Kinner K-5 recently overhauled. Ship just relicensed and in excellent condition. Always hangared; semi-air wheels; compass, pitch and bank indicator; dual controls; \$800. John E. West, Star Route, Berlin, New Hampshire.

WACO CABIN: 1932 model; Continental 210 h.p.; excellent condition. Extras, including steel propeller, leather upholstery, Radio and special paint job. Finished in white fuselage and red wings, and trimmed in blue. Real bargain. Hugh C. Robbins, Waco Distributors, Cleveland Airport, Cleveland, Ohio.

WACO GXE with Tank 73 motor; \$900 cash if sold by July 15. Ship in fine shape, motor perfect. Licensed to June 15, 1934. No trades. C. M. Hale, N. South Street, Wilmington, Ohio.

RYAN J-5: Excellent condition; never cracked. Just relicensed. Tail wheel; navigation and landing lights; steel prop; bank and turn; \$1,500 cash or will trade for Bird, Waco F or Great Lakes. S. H. Leslie, Pikeville, Kentucky.

MONOCOUPÉ: Latest model: wheel pants, brakes, speed ring, navigation lights, 90 h.p. Lambert; with electric starter, metal propeller, extra instruments, etc. Guarantee and prove to absolute satisfaction 87 hours actual time; same as brand new. Cost over \$4,000; sacrifice, \$1,675. Jones Repossessed Car Sales, 121 Alexander St., Rochester, New York.

AEROMARINE KLEMM: LeBlond 60; NC licensed; condition like new, never cracked; extra wing tank. Price \$650. W. R. Lammers, Greenville, Ohio.

FOR SALE: TP Swallow, without motor, dismantled; also Great Lakes right lower wing, wing strut, gas tank; Airwheels, size 22 x 10-4; will accept reasonable offer. Charles Koster, 483 -14th Street, Brooklyn, New York.

MILLERIZED OX-5 with Scintilla mag.; perfect condition, \$75. Lots of Travel Air 2000 parts: spars, ribs, wheels, etc., cheap. Mountain Airways Corporation, Laramie, Wyoming.

FOR SALE: Lambert R-265, 90 h.p. motor. Perfect condition. Ten hours total time. Wood or steel propeller. J4-B Wright motor with small amount of time since major overhaul. Central Air Service, Battle Creek, Michigan.

WACO F2, special sport job: Fairing, steel propeller, air speed, racing cockpit cover. Demonstrator, excellent condition, never cracked. \$1985 net. Air Travel, Inc., Little Rock, Arkansas.

LICENSED THREE-PLACE Hisso Waco: Covering in excellent condition. Ship always hangared. Give away at \$475, including extra motor. Maier, Box 1, Palm Beach Florida.

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FAIRCHILD seven-place: radio bonded, Wasp-powered; many extras, including night flying instruments, electric amperes and voltmeter with regular, built-in landing and navigation lights; full 360 tail wheel; equipped for flares, etc. Like new condition, for \$1,975. 254 Niagara Falls Boulevard, Buffalo, New York.

AMPHIBION: Ireland, five-place cabin, Wright J6-500; just NC licensed. Ship had 58 hours total time; motor had 258 hours total time; 58 hours since overhaul. Has three-bladed steel propeller, safety glass, throughout, bank and turn, inertial starter, booster, airspeed, compass, dual controls, anchor, ropes, life preservers, lights, three luggage compartments, etc. Extra heavy reinforced dual bottom, extra wide sponsons. Can furnish parts for NC Wasp installation if desired. Must sell immediately; wire cash offer if as represented. Cost \$18,500. Asking price, \$3,500. Ralph Kenyon, Newtonville, Massachusetts.

STINSON JUNIOR: Wright J6-5; 400 hours; excellent condition; licensed to October; \$1,275 or will trade on J-5 Lockheed. Pay cash difference. Stanley Fuller, Milford, Iowa.

FOR SALE: Ryan cabin job, J-5 motor; just overhauled; \$750. Louis Andregg, R. D. No. 3, Mansfield, Ohio.

DH GIPLY MOTH: First-class condition, newly recovered and refinished; air wheels; total time 153 hours; 5 hours since top overhaul. Licensed to October, 1933. \$800. John T. Corrodi, Box 165, Bexley Station, Columbus, Ohio.

CURTISS ROBIN: Millerized OX-5; Scintilla mag.; 200 hours total time; licensed. Ship like new. Must sacrifice to best cash offer. George Niemeier, 488 Ryan Place, Lake Forest, Illinois.

WARNER DAVIS MONOPLANE: 135 m.p.h., Curtiss Reed propeller, anti-drag ring, wheel pants, navigation lights, storage battery, special paint job, etc. A real performance ship. \$1,000. M. B. Rich, 17 Harley Street, Dorchester, Mass.

FOR SALE: Lambert 70 h.p. motor, nearly new, a rare bargain for only \$225 with propeller, spinner and hub. Write quick to Brown Metalplane Company, Spokane, Washington.

AMERICAN EAGLE: Szekeley engine. Relicensed June 2, 1933. Excellent condition; \$350 cash. Commercial airport for sale or lease. Gilbert K. Myers, Brackenridge, Pennsylvania.

BELLANCA long distance; just recovered. J-5 Wright Whirlwind motor, perfect condition. Ready to go. Trade small ship and cash. Sacrifice. AERO DIGEST, Box 1560.

AMERICAN EAGLE: Szekeley forty-five motor. Both ship and motor in perfect condition. Will consider any reasonable cash offer. Also used Szekeley motor parts at large discount. Ozark Airways, Inc., Springfield, Missouri.

FAIRCHILD Taper-wing KR-21. 325 hours. Kinner K-5. Semi-air wheels. Licensed till May, 1934. Price, \$975. Yellow wings, black fuselage. Privately owned, always hangared. Fabric and appearance of ship in best of condition. Motor recently top-overhauled, and in perfect condition; there is just nothing that needs to be done. This is one good airplane that is not junk offered cheap. If you are interested to see this ship, I am going to sell, if not my price the best offer. Cash and no trade. If you don't mean business, forget it. K. T. Hager, Hagerstown, Maryland.

BELLANCA CH: J-5; Airwheels. About 10 hours since recovered and major overhaul. Condition as good as new. Price, \$3,500. Might consider small open plane in trade. C. W. Bradley, Room 1434, Edison Building, Chicago, Illinois.

WARNER STINSON: \$800. Challenger Robin recovered, 9000 OX Travel Air, \$450. New Lambert Cavalier, \$1,200. Ships excellent condition and licensed. Consider trades. O. Dickerhoof, Chanutte, Kansas.

WACO 10: licensed to May 15, 1934. Scintilla magnetos, Pioneer compass, new Fahlin propeller. Price \$550. Write for further information. Earl Baber, 752 Lombard Street, Galesburg, Illinois.

BIRD KINNER: New type 100, steel propeller, excellent condition. Moth DH Gipsy, like new. Also new type Kinner 100 with steel propeller. L. S. Bishop, Route No. 3, Wayne, Michigan.

SIKORSKY S-38, 10-place amphibion: Latest model, special equipment. No time on motors or plane since complete overhaul. Private owner selling at big sacrifice. AERO DIGEST, Box 1563.

STINSON, SR.: J6 330 h.p., Model SMIF; like new, in A-1 condition throughout. Motor recently overhauled and up to date. Ship has A. T. C. for pontoons. Priced to sell or will trade. Central Air Service, Battle Creek, Michigan.

CESSNA, J6-7 motor; \$1,200 cash; 4-place cabin; speed ring, turn and bank, new compass, navigation lights. Excellent condition throughout. Entire ship always kept Simozimod. Motor modernized by Curtiss-Wright. Cruises, 120. Actually worth \$1,600. Licensed to February, 1934. William Somogy, 120 Broadway, Lorain, Ohio.

OX-5 MOTORS: Just purchased from the Government. Guaranteed brand new and complete. Shipped with inspection. Reasonable price. Grant Marine Motor Co., 827 Whittier, Detroit, Michigan.

STORMS MONOPLANE: Single place, identified. Less motor. New instruments. Tested with Salmson 40. Ship new last August. \$100. Tyler Howell, Jonesville, Michigan.

FOR SALE: Great Lakes T-2 trainer; English Cirrus motor. 150 hours. Licenses just renewed. Real bargain. Write H. Douglas, 936 Madison St., Oak Park, Illinois.

WACO F: Kinner B-5; full equipped except night flying. Motor hours, 70. Ship like new. \$1,850. J-5 rebuilt, cheap. John Shosie, 837 So. Washington St., Peoria, Illinois.

HISSE E WACO: \$375. Motor completely rebuilt; ship recovered; licensed. Also unlicensed floats. Will take OX-5 Waco as part payment. Hayward Lakes Airways, Hayward, Wisconsin.

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WACO J-5: Excellent condition, privately owned; 150 hours; \$2,000. Waco 90 OX-5, 400 hours; \$450. Box 29, Akron, Ohio.

LATEST TYPE Eaglerock Hissco: \$495; with less than 200 hours; just licensed and in tip-top like new condition. A ship with plenty of control and power at low speed, for banner towing. Flying Service, 254 Franklin Street, Buffalo, New York.

OX-5 ROBIN: 140 hours. Never cracked, A-1 condition, Scintilla mag, Pioneer instruments, duals. \$500 cash. C. Magnusson, 2418 Garfield St., N. E., Minneapolis, Minnesota.

AERONCA two-place: large motor, perfect condition, total time 185 hours. Licensed until May, 1934. \$650. D. W. Flying Service, Inc., LeRoy, New York.

MOTH: English Gipsy. Perfect condition throughout. Licensed. New airwheels. Engine had few hours since overhaul. Total time 470 hours. Sacrifice \$600. Parts for American Cirrus engine, cheap. Aero-Ways Inc., Cleveland Airport, Cleveland, Ohio.

ALEXANDER FLYABOUT: New 45 h.p. Szekely. Total time on ship, 65 hours. Licensed until June 1933. \$750 or best cash offer. Jack Stafford, 3826 St. Charles Road, Bellwood, Illinois.

FAIRCHILD KR-21: Kinner motor, \$1,295. Stinson Detroit, Wright J-5 motor, \$995. American Eagle, Kinner motor, \$795. All in excellent condition, priced for quick sale. Write for complete information. Northland Aviation Company, Minneapolis, Minnesota.

FOR SALE: Challenger Robin; Challenger Fledgling. O. J. Whitney, Inc., Glenn Curtiss Airport, North Beach, L. I., N. Y. Telephone: Newtown 9-0300.

FOR SALE: 5-place FC-2 Fairchild cabin monoplane with J-5 motor in excellent condition. Motor just major overhauled and wings recovered 80 hours ago. Has starter, bank and turn, steel propeller and tail wheel. Total time on ship and motor, 390 hours. Price \$1,350. Will consider smaller ship in trade. Andy Stinis, Floyd Bennett Field, Brooklyn, N. Y. Midwood 8-9192.

NEW EAGLEROCK biplane: Complete less motor; ready for your J-5 or Challenger; a sacrifice at \$1,150. New Eaglerock with rebuilt Hissco A motor, only \$1,150. Eaglerock biplane, now being completely rebuilt, with Hissco A motor; or less motor, with J-5, Challenger, J-6 or Comet motor mount, a bargain at \$640. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

GUARANTEED used planes at the right price. Laird LC-B Wright J-5, Laird LC-B Wright J-6 300. Buhl CA-6 cabin plane. Also set Bellanca 300 Pacemaker wings. Send for complete list. E. M. Laird Airplane Company, 5301 W. 85th Street, Chicago, Illinois.

FOR SALE: Wright J-5. Completely rebuilt Eclipse starter. Hamilton propeller reconditioned by Fords. Write for further information. John Princl, 402 Woodson St., La Porte, Indiana.

FOR SALE: Aeromarine Klemm, low-wing monoplane, LeBlond 65, N.C. licensed till June 15, 1934. Excellent ship instruction, students, etc. Easy to fly, stable, low landing speed, will not spin. Equipment includes duals, air wheels, navigation lights, extra wing tank, oleos. Price \$650. Laurence Raynolds, Allenhurst, New Jersey.

J-5 STRAIGHT WING WACO: Just relicensed, perfect throughout, 85 hours on motor, full of extras; \$1,350 in New York. Will deliver anywhere for expenses. AERO DIGEST, Box 1566.

201 MODEL Kinner K-5 American Eagle, and OX-5 American Eagle 1930. Both just relicensed. Best offer accepted. Also Travel Air wings and parts, OX-5 steel propeller and 2 OX-5 parts, one with Scintilla magneto, and Kinner K-5 parts. Carl V. Seltzer, 1909 Riverview Drive, Endicott, New York.

DAVIS KINNER 100: Metal prop, chromium exhaust ring, low-pressure tires, brakes; privately used; 80 hours; perfect condition. Write for bargain price. Davis Aircraft Corporation, Richmond, Indiana.

FOR SALE: Two single-place and one two-place Aeroncas; Hissco Eaglerock; Challenger Robin; Nicholas-Beazley 8. Excellent condition. Bargain prices. Rapid Aid Lines Corporation, Huron, South Dakota.

FOR SALE: Two upper Whittelsey Avian wings with slots, \$50. Two 7-cylinder Scintilla magnetos for Axelson motor, \$50. Whittelsey Avian, perfect condition, many extra instruments, \$595. OX-5 Travel Air, just recovered and relicensed; looks like new; a sweet job for \$645. Pioneer experimental two-place monoplane, complete less motor, prop and instruments. Will take any radial motor up to 150 h.p. A beautiful flying ship; \$225 or will trade for J-5 or what have you? Arrow Sport, Model 2A, just recovered and relicensed. Looks and flies like new. \$765. Aeromarine Klemm, just recovered. Less motor and prop \$295. OX-5 Challenger, relicensed in May; perfect condition, \$495. Buhl Pap: nice shape, just relicensed; \$475. Slim West, Teterboro Airport, Hasbrouck Heights, New Jersey.

WACO 9: Complete, entirely recovered. OXX motor, just overhauled; new valve action, etc. Not flown since overhaul. License expired; ship in dead storage two years. Sale price, \$195 cash. George Bustard, 529 West 131 St., New York, N. Y.

FOR SALE: KR-34 Challenger with Wright J-6 engine. Motor needs repairs. \$650. Warner Stinson Jr., 4-place; fuselage needs recovering for relicensing. \$450. Will fly anywhere for expenses. Fred Vilsmeier, 857 East Luzerne St., Philadelphia, Pennsylvania.

MONOCOUPÉ: Velie engine; no time since complete motor overhaul. Recovered, fabric like new. Many extras. Bargain, \$600. Fonda Aviation, Inc., Westfield, N. J. Telephone, Rahway 7-2037.

STINSON JR., J6-5: Time, 290 hours; 20 hours since motor and ship gone over and relicensed; completely recovered; finished in new two-tone factory paint job. Newly upholstered in pigskin with brown trim. New Wilton rug flooring. Metal chrome finished. Beautiful new appearance. Must sell; best offer; terms to responsible party. David G. Bender, 2240 Farwell, Chicago, Illinois. Telephone: Briargate 6384.

AVRO-AVIAN, licensed; ship and motor in perfect condition. Priced for quick sale. Edward Muscott, Ithaca, Michigan.

STINSON J6-7 on floats, Heywood starter, \$2,500. Lycopring Stinson, \$1,600. Waco F, \$1,500. Arrow Sport, \$500. Fleet, like new, \$1,150. Pioneer Aviation, Airport, Syracuse, New York.

TRAVEL AIR 2000: Scintilla, Millerized. Semi airwheels, lights, wood or steel prop. Excellent paint and cover. Licensed April, 1934. \$600. Whitney, 6 Beech Street, Garden City, L. I., N. Y.

OXX-6 TRAVEL AIR: Covering year old. Air wheels. Overhauled motor. Scintilla mag. Spare left wings. Russell parachute. \$450 flyaway. A. S. Harvey, White River Junction, Vermont.

WACO F-2: 165 Continental, complete set of instruments, wing-root fairing, radio shielded. Total time, 210 hours; 10 hours since major overhaul at Continental factory. Privately flown, like new ship. Price, \$2,850. Silk seatpack chute, never jumped, like new, to purchaser. Laura M. Schmidt, 630 East Town Street, Columbus, Ohio.

TRAVEL AIR 2000: Excellent condition; beautiful job; licensed. 130 hours. Hanson Airport, Youngstown, Ohio.

WARNER CESSNA: Four-place cabin monoplane. Semi-balloon tires, tail wheel, pants, speed ring, steel propeller. Entire airplane like new. Less than 300 hours. \$1500. Wilson, 1130 Wenonah Ave., Oak Park, Illinois.

FOR SALE: At sacrifice price, 165 Continental; total time, 240 hours. Condition excellent. With or without Curtiss-Reed propeller. AERO DIGEST, Box 1570.

USED PLANES at sacrifice prices. Travel Airs, Wacos, Flyabouts, Robins, Juniors. List your used ship with us. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

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SCINTILLA MAGNETO repairing. Quick service. Save a week by sending to Streed. Instrument repairing. Write for estimates. Streed Electric Company, 1312 Harmon, Minneapolis, Minnesota.

APPROVED REPAIR STATION equipment, classes 1-2-3-4-5-8 and aircraft mechanical school with excellent possibilities. Operate anywhere. \$950 or trade for licensed airplane. Raker, 208 McKinnie, Fort Wayne, Indiana.

RENT OR LEASE: 100-acre airport. Ten plane hangar, office, lunchroom, cindered runways. If interested, address E. F. Schilling, Brinker & Sullivan, Columbus, Ohio.

STUDENT OPPORTUNITY: Work in large reconstruction plant under direction former Army officers. Tuition only \$5 per week. Time applies on license. AERO DIGEST, Box 1561.

USED OR DAMAGED airplanes reconditioned at no cost to owner until ship is sold. W. W. Wimbush, Hebron, Airport, Hebron, Maryland.

EXPERT REPAIR WORK, all types. Complete stock aircraft materials at sacrifice prices. Factory built Eaglerock parts. Department of Commerce Approved Repair Station. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

Wanted To Buy Or Trade

WANTED: 110 h.p. Warner engine with latest type heads. Must be like new and priced right. Tulsa Commercial Airport, Inc., Route 11, Tulsa, Oklahoma.

WANTED: Edo floats, size 3300. AERO DIGEST, Box 1556.

WANTED FOR CASH: Eclipse hand turning gear with hooster magneto for Wright J6-5. Also one set of Bendix 26 x 5 wheels, with brake assemblies; good condition; axle size 7/8 x 1 1/4. L. E. Derryberry, Abilene Air Terminal, Abilene, Texas.

WANTED: Licensed Aerona or similar light ship. Must be cheap. Henry Ludwig, R. D. 4, Pottstown, Pennsylvania.

WILL TRADE Travel Air OXX-6 plane, dual controls and many extras, having 45 hours flying time; ship just been recovered and motor overhauled; never been in crack-up; guaranteed to be in perfect shape; for a late Auburn or Graham Paige or speed boat or small cruiser. For further information write to Antonio Belotti, 682 Acushnet Avenue, New Bedford, Mass.

WILL PAY cash for light plane; one, two, or three place. Must be good shape. Write Mr. Manoir, 209 Morris Avenue, Spring Lake, N. J.

WANTED: Moth, Avian or ship this class, licensed; prefer with slots. Give full description, best cash price first letter. P. O. Box 1492, Charleston, West Virginia.

WANTED TO TRADE: Warner-powered Waco F, like new, equipped with Heywood starter, steel propeller and motor cowl ring; for Model C Waco or Stinson. Oliver M. Huff, Glade Spring, Va.

CASH FOR air-cooled planes up to 250 h.p. Any condition. Give complete details and price in first letter. AERO DIGEST, Box 1564.

WE WANT TO BUY nickel steel nuts, steel tubing, instruments, airplane supplies of any kind. Spot cash for bargains. Crawford Airplane Supply Co., Venice, California.

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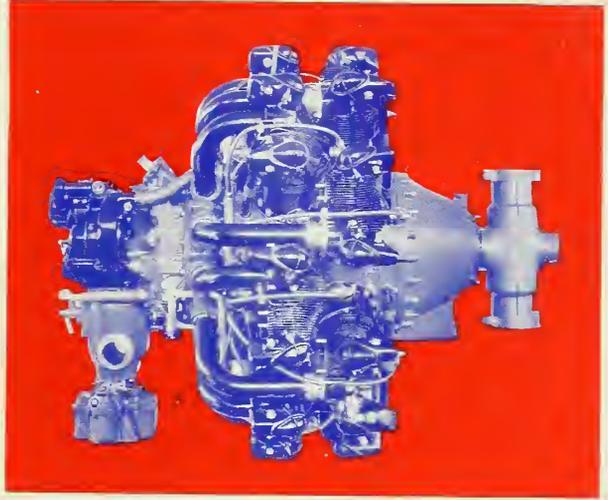
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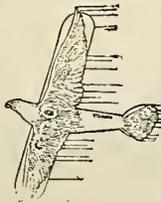
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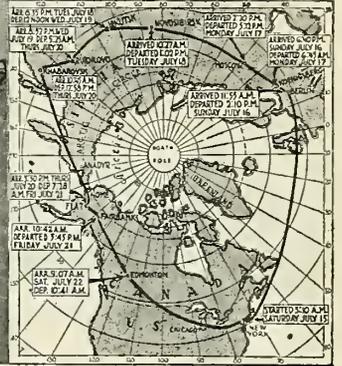


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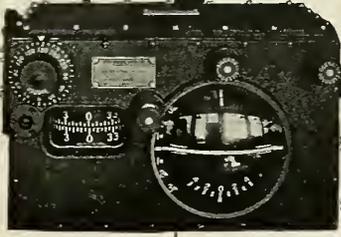
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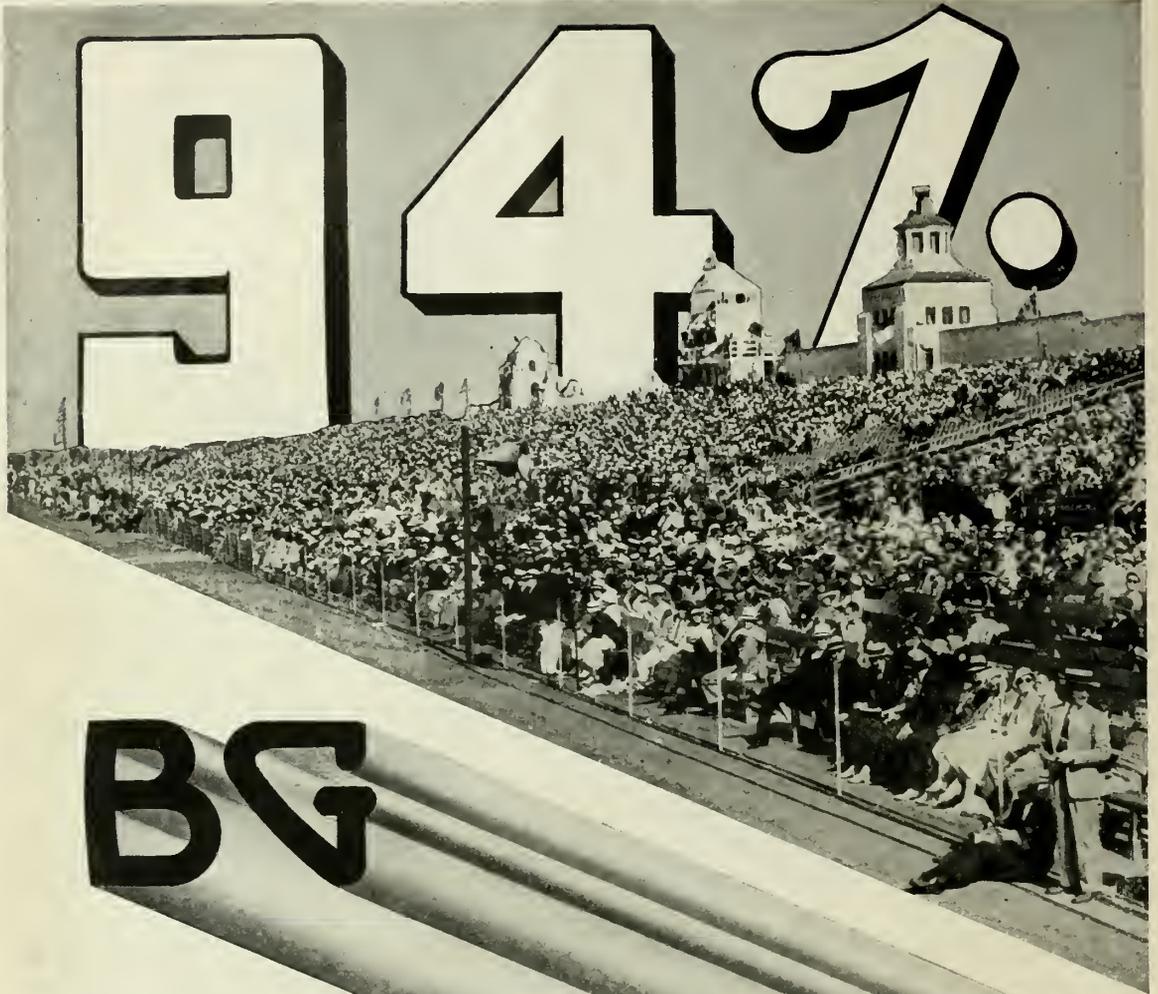
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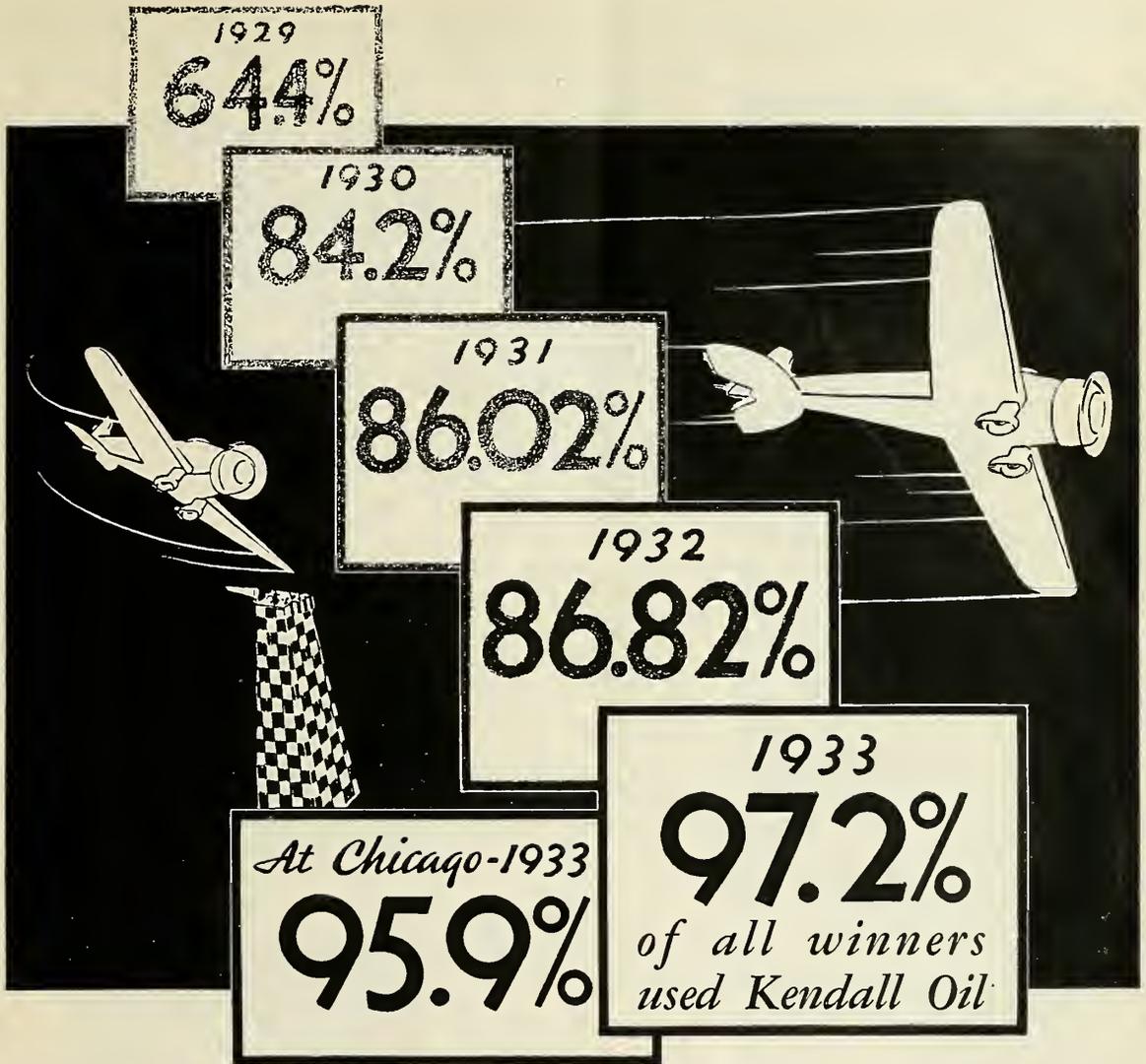
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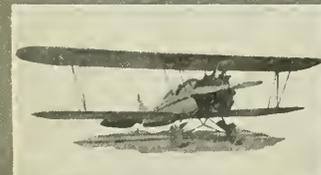
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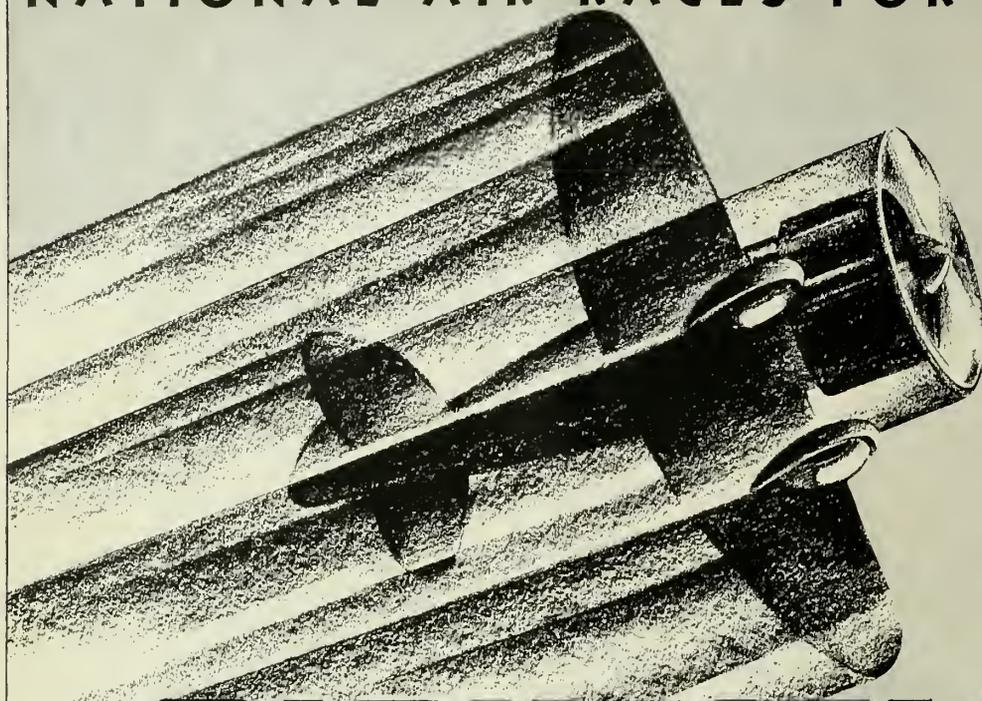
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Wiley Post's P. & W. Wasp-powered Lockheed Vega Monoplane "Winnie Mae" and a map of his route around the world. (Map courtesy of N. Y. Times)

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General Balbo, his crew and some of the S-55X seaplanes of his aerial armada

Uncle Sam—Sky Sluggard

COL. E. V. RICKENBACKER

Chairman, American Legion Aeronautics Commission

● Italy's formidable mass flight of seaplanes from Europe to the United States is a challenge that should rouse America from her lethargy of recent years toward the importance of military aviation as an adjunct to any adequate system of national defense. It is a friendly invasion of our skies and one to be welcomed in that spirit. At the same time, unless we are utterly obtuse, the visit should be a sharp reminder that the rest of the world has forged steadily ahead in aeronautical development while this country has been marking time.

The advent of the Italians will render us a real service if it jogs our national consciousness into the realization that we have lagged in the air until we are now the fourth world power in terms of sky strength. This should be a bitter pill for the country that gave heavier-than-air flying to the world—and whose attitude at the moment seems to be to let the world do as it darned pleases with it. Italy, France and Great Britain already are far ahead of us in air strength and aeronautical enterprise; there is reason to believe that Russia and Japan soon will pass us on the same road unless we bestir ourselves to recover our long-lost leadership and prestige.

There was a time when Uncle Sam yielded first place to no one in pushing forward the ever-advancing frontier of aviation. Our Navy was the first to fly the Atlantic; it was a group of Army airplanes that completed the first flight around the world. To the same service belongs the honor of achieving the first non-stop crossing of the United States and the first flight from California to Hawaii. It was once the fliers of the American military services who established nearly every worthwhile record in the category of aerial achievement; now one searches the lists in vain for the names of Army and Navy airmen.

Still more discouraging is the fact that, having thrown up the sponge to other nations of the world and to such of our own commercial aviators as have the enterprise and means to go out after world records for themselves, our military flying services haven't even succeeded in laying out an aviation development and procurement program for the future now immediately facing them. More than that, they have failed to complete the construction allotted them under the original Morrow Five-Year Aircraft Building Program—an intelligently planned approach to the problem of aerial preparedness which badly needs to be



repeated now so that the country will know just whither it is headed in aviation and why.

Let there be no confusion about the importance of such action. Our President and his advisers already have acted upon the realization that in the world's present troubled state, with economic and political revolutions the order of the day, it is imperative to build up our Navy to full treaty strength and to place our reliance no longer on peace pacts and international ideals to which no nation but ours seems willing to adhere. What we must not lose sight of in this eminently sane and timely revision of our national policy is that mere size will never make our Navy supreme—that an adequate complement of aircraft and aircraft carriers alone can achieve real parity for us and insure against our being out-matched by a smaller but better balanced fleet. Neither the battleship nor the airplane can get along without the other.

Importance of Army Aviation

Nor can we afford to be content merely with making sure that the air forces of our Navy are brought up to par and zealously maintained there. Army aviation is even more important to the Nation's welfare and safety—in that it will be our last line of aerial defense should war come—though it would be national madness to think of either branch of the service in the sense that we might dispense with the other. In time of peril it would be impossible for the Navy to "stay put" in any given position; its striking power and strategic value rest primarily on its ability to appear in unexpected places, and it would be sadly crippled indeed if it were not left free to move where the exigencies of a particular situation might demand. Without an ample Army air force to cope with possible surprise attacks by planes launched from enemy carriers suddenly appearing anywhere off our far-flung coast line, the country would be "cold turkey" for any first-class fleet possessed of modern aviation equipment that managed either to elude or to defeat our own naval forces or to appear unexpectedly on the opposite side of the continent from them.

The importance of this "home guard" role that the Army air forces would be called on to play in case of war is hard

to overemphasize. It can not be measured simply in terms of military profit or loss because the effects of a major air raid against one or more of our major seaboard cities would be far more profound than the mere property damage and loss of life inflicted, however great that might prove in a bombing raid by modern dreadnaughts of the air. Such a raid readily enough might so shake the morale of the people, especially if the war had become long-drawn-out and hardships were beginning to be felt at home, as to turn the whole tide of conflict and set the weaker elements of the Nation clamoring for "peace at any price." This is a matter to bear in mind and weigh well before accepting governmental economies—even in these times—at the expense of adequate air defenses for America both on land and sea.

It is well to remember, too, in considering the sums spent in this country for airports and lighted airways, for radio beacons to guide airmen across the continent when they can see neither earth nor sky, that these commercial developments could be turned to good account by our military aviation in time of war. Indeed, without them, our air forces in the Army would be hamstrung and helpless. For they are the means by which our flying armies may be mobilized within a day and a half at any point on the border of the United States threatened with enemy invasion. An airplane may become obsolete almost overnight, but a first-class airport will always be as indispensable and as much in vogue for the succeeding type as for the one that has just been relegated to the aeronautical scrap heap.

This country's decadence in military aviation—and there is abundant evidence on every hand that we have fallen woefully behind the aerial preparedness procession—is said by many observers to date from our abandonment of the old Pulitzer Trophy Race for landplanes and the Schneider Cup classic for seaplanes. Out of these events evolved the planes and motors from which we have fashioned our fastest fighters of the air. But a few years ago the Army and the Navy abandoned, first the Pulitzer and then the Schneider, saying that the cost of developing experimental racing planes was too high compared to the knowledge gained from them. At that time these events were being won by Uncle Sam's fliers at the "phenomenal" speeds of 240 to 260 miles an hour.

Italy and Great Britain persisted in the

"folly" which we had forsaken, and the world's speed record went back to the Old World. It passed 300 miles per hour, then 400. Just now it has a good start up the ladder toward 500 miles an hour, a goal many think it will reach within the next year or two. Impracticable airplanes? Yes! But our friends across the sea, who have spent millions of dollars developing planes to fly at these speeds, are learning lessons from these "trick" racing machines which are applied to their standard military types and one of these days may cost an "economical" America many times the millions she has saved herself by withdrawing from such competition.

Italy's mass seaplane flight to our shores is said to represent an expenditure of at least \$1,500,000, yet Premier Mussolini and the Italian people seem to feel the venture has been worth while for the prestige it has given their nation and the experience gained by the personnel of the flight. It has been at once a daring and arrogant gesture, for it has served notice on the world that, in case of necessity, Italy's flying boats can and will go where they choose. . . .

France Leads in Numbers

France has been keeping abreast of Italy and Great Britain in aeronautical development and still leads the world in sheer numbers of military aircraft. England's air force is next in point of size. Just how many fighting planes await the beck and call of Mussolini seems something of a secret, but the known total is in excess of those the United States could mobilize if the fate of the nation were at stake.

The French seemingly find themselves in such financial straits that they must ignore entirely their war debt obligations to the United States, but somehow, somewhere, they find sufficient funds to subsidize the French Aeropostale line in South America, which competes directly with our own Pan American Airways. Ironically enough, our own governmental retrenching probably will dictate a reduction of the indirect mail subsidy Pan-American gets from Uncle Sam, while its rival transportation system continues to be aided by funds from a France that continues to protest her inability to pay Uncle Sam anything on account.

The ready and willing manner in which the nations of Europe come to the aid of their commercial airlines indicates the value they place on these systems as an adjunct to national defense. It is in sharp and humiliating contrast to the general attitude of the United States, which, except for air mail contracts, leaves the brunt of all development and pioneering work on the shoulders of private enterprise. The trans-Atlantic Italian formation flight, for example, is

an excellent piece of trail-blazing for a possible air route from Europe to America, should Mussolini's flying men report to him that they consider such an enterprise feasible for Italy to undertake. At the same time that it was being made, however, privately financed expeditions sent out by Pan American Airways were in the same territory exploring the possibilities of just such a service between this country and Europe—without the benefit of any assistance from the United States.

Pan American likewise has its eye on a trans-Pacific route from San Francisco to Hawaii, Midway Island, Guam, the Philippines and China, but it will have to put through the necessary surveys without governmental aid. To fly both this route and the one across the Atlantic it will need special, long-distance equipment such as would be developed in England, Italy, France or probably any other nation in the world save the United States at governmental expense or at least with governmental assistance. But the giant flying boats which the line expects to use for this work were engineered and are now being built for the company out of its own funds, though the Government, obviously, will derive tremendous benefit if these air routes are established and should be profoundly interested in the military possibilities of these new-type airplanes which are guaranteed by their designers to have a cruising range of more than 3,000 miles non-stop at an average speed of 150 miles an hour. This instance is no isolated case of Uncle Sam's lethargy toward significant developments in aviation; it is typical, on the contrary, of his strange behavior toward a subject of such vital importance to his welfare.

Dozens of other ways might be cited in which foreign nations encourage the development of aviation where this country either ignores such opportunities or actually throws obstacles in their way. One good example is the light airplane club, which is subsidized by the Government in England, Australia and Canada in order to build up popular interest in flying and create a substantial air reserve which could be whipped into shape for military flying in short order after the outbreak of a war. A similar system is followed in Italy and in France, where the Government encourages private owner-fliers by promulgating air tours of various sorts. Again, there is a standing cash prize in France for any pilot who establishes a new world record—a scheme that might be introduced to good advantage in the United States.

Indianapolis Air Meet

AMERICAN WAR MOTHERS and clothing relief work of The American Legion will benefit from the proceeds of an air show and air races held July 15 and 16 at the Indianapolis (Ind.) Municipal Airport. A large part of almost \$3,000 received from the advance ticket sales and other proceeds of the events will be devoted to the Indianapolis Legion fund for the entertainment of the American War Mothers at their national convention in Indianapolis September 26-30.

In addition to the races, in which John Livingston was starred, outstanding events of the meet included stunting of a Ford trimotor, delayed parachute jumps, aerobatics, an aerial dogfight and an exhibition of flying in an antiquated pusher type. Four ships of the 113th Observation Squadron, Indiana National Guard, raced for the Robert C. Winslow Trophy over a twenty-five-mile closed course on the first day of the meet, and on the following day high-speed racing planes competed over the course.

The meet was supervised and handled by members of The American Legion exclusively. The whole project was in the nature of a proving ground to determine the practicability of Legion Departments, districts and posts as sponsors and supervisors of air shows and races that are at once a community activity and a money-raising plan for the charitable activities of the Legion. From the results obtained with the Indianapolis plan, it is evident that the air show idea is not only practicable but highly desirable for other districts as well as departments of The American Legion.

Another important result of the Indianapolis show is the increase in airline passenger traffic since the dates of the show.

Annual National Model Meet

THE FIRST Annual National Model Airplane Contest of The American Legion will be held at Chicago, Ill., September 30 and October 1. All contests will be established on the basis of junior and senior classes, the junior classes including boys from 10 to 15 years of age and the senior classes comprising entrants from 15 to 19 years old. An adult class will also be arranged. Boy Scouts entering the contests will attempt to qualify for the Boy Scout aviation merit badge. Duration and commercial contests will be conducted for both outdoor and indoor models. Among other events will be a speed contest, to be held outdoors, and scale model and experimental aircraft competitions, to be judged indoors.

Additional details may be secured from the National Aeronautics Commission, National Headquarters of The American Legion, Indianapolis, Ind.



AIR

hot and otherwise

FRANK A. TICHENOR

Going Ahead

● We had occasion in this department last month to point out that the aviation industry was on the eve of important changes and that the new day which was coming would afford opportunities which the industry must not be permitted, for reasons of greed and selfishness, to miss.

Things have moved even more swiftly than we anticipated. Steps have been taken which make possible a complete new deal for aeronautics. It took a special meeting of the Aeronautical Chamber of Commerce to get things started. It required the submission of drastic revision of the constitution and by-laws of the Chamber to eradicate some of the more serious handicaps of the old regime. We confidently believe that a step in the right direction has been taken, and that if unanimous support is given to the Chamber's directors at the special meeting of organization members, which has been called, we will be able to eliminate some of the foolish things which have been done from time to time in the past.

It was inspiring, to say the least, that the special meeting of the governors which initiated this new undertaking was one of the best attended in the history of the Chamber. At least the leaders of our industry represented in the management of the Chamber were aware of the low estate to which co-operation had fallen on the industrial side of the field of flying.

Co-operation in the recent past seemed to mean to many a method of getting the most out of the business for each selfish individual and completely disregarding the interests of aeronautics as a whole. Since the Chamber management now realizes that that road leads nowhere, it is up to the individuals to indicate their whole-hearted support for the Chamber's new plan.

New Deals are nothing new to aviation. Our field of endeavor and activity has been extremely fortunate in its comparatively short history in getting "new deals." We certainly had one as recently as 1927-28. There were certain advantages inherent in that sudden re-awakening of popular interest in flying which were never fully realized. The difficulty was, and probably still is, that many of us expect all the aces in each new deal. It just can't be worked.

Consolidation of position gained through unselfish, co-operative action is the only lasting good which can be

achieved by these recurrent opportunities for progress. Through the Industrial Recovery Act the new Administration in Washington intends to see that the maximum of co-operation is attained—if not voluntarily, perhaps otherwise. The Aeronautical Chamber, under the leadership of Thomas Morgan, has cleared the decks for action, in order that those in the industry may be in a position to take advantage of everything which this new program offers.

Aviation Again in Public Spotlight

Aeronautics is in an extremely fortunate spot. The important thing is to realize it. We have urged, pleaded, and at times even railed against those who couldn't see the need for unselfish co-operative measures. Now it is being forced upon us by an act of Congress and government order. The splendid flights this month by Balbo and his Italian compatriots and by Wiley Post has once again focussed world-wide attention upon flying. As it has not been in several years, the American public is again evidencing the keenest interest in aeronautics. Anything can be done with such popular interest. A great many wrong things were done when we had it last and so recently in 1927-28. We won't go into those mistakes now. Most of them are too well known to require repeating.

But in addition to something comparable to the public furor and interest which we had in 1927, we have today to build upon a solid structure of a national air transportation system. This is fortunate, because in this there exists a special opportunity.

Flying can become the keystone of our transportation system. Flying is rising to new heights just when some of the older forms of transportation are foundering. Now, when the railroads are undergoing drastic reorganization at the hands of the government, is the time to make it perfectly clear that *distance* belongs to the airplane. As we begin to rebuild our transportation system with the aid of that co-operative action of the govern-

ment, mentioned before, let us assist the Chamber in making it perfectly clear to the American people that we believe that by far the largest portion of long distance high speed travel will be through the air. We must see to it that the transportation system is rebuilt with that idea in mind. It has a sound, economic base. The important thing in rail transportation is not that there are two magnificent terminals in New York, and two more in Chicago. The important thing is that there are hundreds of little way stations scattered along the railroad right-of-way between Chicago and New York. The huge investment made and existing in these station facilities indicates clearly that this short point-to-point travel business belongs logically to the train and the bus. The bulk of the rest we believe rightly can be claimed for the airplane.

We cite this opportunity for air transportation in this connection for a specific reason. It is both an opportunity and a task in which those supporting the new policy of the Chamber can co-operate. The Industrial Recovery Act impels a higher degree of government activity in aeronautics than ever before. We have seen in the Balbo flight what flying can mean to a government; how it can be made to function when it becomes completely integrated as a government activity.

Many Good Points Can Be Achieved

We do not expect to see immediately in this country any such unified control over our flying activities as that exercised by Mussolini over Italian aviation. The Balbo flight indicates some of the advantages of such control, which no doubt has many good points.

But many, if not all of these good points, we believe can be achieved through the plan now before us. The new Administration in Washington intends to take an increasingly important supervisory position in regard to industry. It intends to do this through the trade association. Our trade association—it was hardly that except in name in the past—is the Aeronautical Chamber of Commerce. The promise of swift action to reorganize the Chamber has been fulfilled. We urge upon the membership of the Chamber speedy ratification of the proposed changes in order that the industry may move forward to complete realization of one of the greatest opportunities which ever has come to it.

Without Benefit of Clergy

•
CY CALDWELL

• QUITE by chance an ancient Assyrian document was unearthed during excavations in the Bronx—an Assyrian colony—when workmen were tearing down a house owned by a former saloon-keeper to make way for a mansion to be erected for a czar of the loose milk racket, which proves that the world does progress, after all, though whether backward or forward is not immediately clear. Here is a liberal translation of the ancient parchment:

"And it shall come to pass in the first year of the reign of the Great Pharaoh Tut-Tut-Roose-Velt-Amen that there shall be dissension and strife in the land of Nutz; and some four and a score horsemen of the Apocalypse who guide the fast air chariots shall rebel against the sacred authority of the great god NAA; and they shall raise their voices, like pelicans crying in the wilderness, calling down maledictions upon the white-washed head of that saintly scribe and pharisee, the High Priest Hi-Ram-Bing-Ham, Grand Exalted Snapdragon of the Temple of NAA.

"And behold it shall come to pass that the Grand Exalted Snapdragon, after demanding *backsheesh*, shall award his blessing to the fast charioteers of the Caliph Cliff-El-Henderson; and shall deny his holy sanction to the charioteers of the Caliph Shorty-El-Schroeder, even unto the third generation thereof, both male and female and indeterminate. And they shall be damned everlastingly.

"And when the season of charioteering is come, the High Priest Hi-Ram-Bing-Ham shall gird up his loins and shall journey up into a mountain in the land of Yesmen, which is called Hollywood. And he shall make incantations and shall smite a rock with his staff, crying, 'Oh mighty NAA, ruler of the air waves, why hast thou forgotten thy servant? Pray send thy violent winds and rains of adversity to overwhelm and blot out the Caliph Shorty-El-Schroeder and all his works; and they that are with him, even unto the last infant and the last grease-ball.'

"And behold it shall come to pass that the spirit of NAA shall move upon the night with a violent wind; and it shall rend the encampment of the Caliph Shorty-El-Schroeder; and the tents of the captains

of the host shall be blown down and dispersed; and the stands for the populace, or *hoi polloi*, they shall be hurled down; and the fence of cloth, erected to grieve the indigent who may not peek free, it also shall be blown upon with a great wind, and reduced unto shreds. And there shall be wailing and gnashing of teeth among those Philistines who bow not down to the great god NAA; and sore destruction shall visit the shores of the lake named Michigan, called also the Dead Sea because of a parachute jumper who leaped therein without pulling his rip-cord."

And the Wind Storm Did Come

There was much more of this ancient prophecy, but my translator, an old Assyrian rug merchant, who had been drinking gin and nibbling sandwiches during the translation, ate the balance of the parchment in mistake for a cheese sandwich, which it somewhat resembled; so the rest of the prophecy is lost. However, it must have been true, for when I arrived at Chicago on Sunday, July 2, to watch these outlawed pilots do their stuff, I found that a violent wind storm, undoubtedly sanctioned by the N. A. A., had destroyed part of the air-racing plant, just as the Assyrian prophet had foretold. During the height of the tornado, I learned, that great mass of muscle and bone called Frank McKay had been pitting his strength against the elements. As the wind blew on one side of the grandstand, Frank pushed on the other side. And all would have been well—for the wind couldn't move the stand with Frank holding it—but unfortunately there was a lull in the storm, the force abated, and the mountainous McKay, still heaving with might and main, hurled the entire grandstand to the ground. Then he fell upon it and crushed the timbers into toothpicks.

When the tall home pylon went crashing to the earth there were shrieks of despair that soon turned to shouts of joy; for Shorty Schroeder himself, the tallest pilot in America and the only one who always seems to be walking on stilts, dashed out and stood as a pylon for the balance of the meet. The racing pilots never knew the difference.

Carpenters and other workmen set to with a will, at double wages for Sunday, and by Monday the sun was shining on as fair a scene as these old eyes have encountered; there were the stands, as good as ever, with a crowd of over 40,000 Philistines from Cicero and Chicago. According to a statistical expert, there were 38,000 racketeers and 2,000 honest citizens present; but I couldn't tell them apart. And it's a funny thing, but not one of those who paid admissions stopped to inquire whether or not Brother Bingham had blessed the affair by the laying on of hands, or whatever mumbo-jumbo it is that the old boy uses when he sanctifies air races. No, the people just paid their money and walked in, sanction or no sanction; and on Tuesday again some 60,000 racketeers and taxpayers paid admissions. Twenty thousand had to stand up—of course, they were only taxpayers, so nobody cared a hoot. It all went to show that the right management really can run air races without N. A. A. sanction, and still pay \$20,000 in prize money. In all four days 150,000 people paid to see the races.

Incidentally, the pilots didn't have to wait ten days or until the end of the meet to get their money. At the conclusion of each day's races, there was Major Schroeder walking around with his pockets bulging with checks and cash for that day's events. It was such an amazing innovation that old racing pilots fainted and had to be revived by cold beer bottles pressed against their brows.

But this American Air Race Association meet held many other surprises. I missed the annual battle of the Passes, when those doughty Afghan defenders of the Pass, Cliff and Phil, hold the In-accessible Pass against all comers, and only surrender after receiving a war indemnity, called a Service Charge, of \$5 per ticket. At Chicago a pilot's or mechanic's license served as a pass, and in he went rejoicing. Loud were the praises for Shorty Schroeder and his generosity, which also was good business. Instead of collecting a few extra reluctant dollars, he won the good will of every pilot and mechanic who attended, and avoided the usual hard feelings, the curses and the loud outcries that invariably accompany air races.

Events Organized in Advance

Another surprising thing was that the daily pilots' meeting was attended by *all* racing and exhibition pilots. Under the able management of Jack Story the meeting discussed every detail of the show, and every one knew exactly what he had to do in the air, where to do it, and when to do it. So every show event and every race went off exactly as scheduled, with every movement of every plane (except, of course, those in the speed events) ar-

ranged for in advance. Thus as Chief Announcer, Jack Story was in a position to give a running account that really tallied with the movements of the planes, which startled many of us who through the years have watched that sad tribe of Lost Air Announcers, who stare up into the heavens wondering helplessly what the performer is going to do next, shouting, "Now he's going to loop!" Only he doesn't loop—he rolls or spins—while the crowd stare at each other and curse the announcer, saying, "What manner of man is this? He knoweth not what he sayeth." Jack Story did the best exhibition event announcing I have heard at any air meet, thanks to careful preparation.

of which he knocked off 242.34 m.p.h. in his small Cessna racer, powered with a Warner engine. Livingston won both \$5,000 feature events of the American Air Races, the Baby Ruth trophy race and the AERO DIGEST trophy race, collecting total first prize money of \$4,500, which isn't too bad when you consider that he was practically flying without benefit of clergy, having been denied the holy sacrament administered by High Priest Bingham of the N. A. A. This leads me to believe that unless Brother Bingham changes his ways, or, happily, is gathered to his fathers, that we will build up in the United States two rival camps of air racing pilots, the sanctified and the unsanctified. Such a condition is to be regretted, of course, for we want no division in the ranks of racing pilots. But if needs be, then needs must; though I cry out against it and plead for mutual toleration, friendliness, fair dealing and brotherly love under a purified and much more enlightened N. A. A., shorn of the

numbering and decaying influences that have made it a noxious stench in the land.

Pilots, Etc., Sign Formal Protest

As a matter of record, all of the racing pilots, exhibition pilots, aircraft manufacturers, and many of the airline pilots on the Municipal Airport on July 5 signed the following protest to the Fédération Aéronautique Internationale: "In view of the fact that a competing air race promoter was a member of the Contest Committee of the National Aeronautic Association, and voted to sanction his own two meets and voted by proxy not to sanction the American Air Races held at Chicago, Ill., July 1, 3, 4, and 5, 1933, we, the undersigned pilots and officials at whom threats of suspension have been directed by officials of the N. A. A., do hereby respectfully request that the F. A. I. prohibit any of the below named pilots and officials from being suspended by the N. A. A.; and that immediate steps be

(Continued on page 68)

CHICAGO AIR RACE RESULTS

**350 Cu. In. A.T.C. 5 laps, 5 mile closed course.
Krim-Ko Trophy, \$1,100**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Harold Neumann, Moline, Ill.	Monocoupe	Lambert	266 112.37	\$550
Charles Smith, Cleveland, O...	Great Lakes	Cirrus	310 108.80	275
Roy Hunt, Oklahoma City....	Great Lakes	Cirrus	310 106.04	165
R. Tooman, Jr., Muscatine, Ia.	Monocoupe	Velie	250 103.59	110

**115 Cu. In. Free-For-All. 5 laps, 5 mile closed course.
Polish Trophy (First Heat), \$1,000**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
A. J. Davis, E. Lansing, Mich.	Heath	Continental	115 100.73	\$450
Art Carnahan, Bloomington, Ill.	Tilbury-Fundy	Church	108 94.60	250
C. E. Recknagel, Vandalia, O.	Aeronca	Aeronca	106 73.01	150
David H. Bishop, Chicago, Ill.	Chilleen-Fitton	Church	110 65.83	100
James McKenna, Cbicago, Ill.	Heath	Heath	83 61.83	50

**500 Cu. In. A.T.C. 5 laps, 5 mile closed course.
Atlas Brewing Co. Trophy, \$1,100**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Jack Wright, Utica, N. Y....	Monocoupe	Warner	422 142.52	\$495
M. King, Fairmont, Minn....	Monocoupe	Warner	422 124.27	275
H. MacCloskey, Pittsburgh, Pa.	Monocoupe	Warner	422 122.98	165
Clyde Pangborn, New York				
City, N. Y.	Monocoupe	Warner	499 121.41	110
Eldon Cessna, Wichita, Kans.	Cessna	Warner	422 120.39	55

**350 Cu. In. Free-For-All. 5 laps, 5 mile closed course.
Hotel Sherman Trophy, \$1,500**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Harold Neumann, Moline, Ill.	Folkert	Cirrus	310 149.01	\$675
J. Jacobson, Kansas City, Mo.	Gipsy		318 139.74	375
C. McArthur, Tampa, Fla....	Heath	Martin	333 127.76	225
H. Mummert, Hammondsp., N.Y.	Mercury	Cirrus	302 126.91	150
M. King, Fairmont, Minn.	Monocoupe	Lambert	266 110.73	75

**500 Cu. In. Free-For-All. 7 laps, 5 mile closed course.
Baby Ruth Trophy, \$5,000**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
John Livingston, Aurora, Ill.	Cessna	Warner	499 201.42	\$2,250
A. J. Davis, E. Lansing, Mich.	Cessna	Warner	499 200.76	1,250
Harold Neumann, Moline, Ill.	Howard	Menasco	484 177.10	750
Jack Wright, Utica, N. Y....	Monocoupe	Warner	422 162.29	500
M. King, Fairmont, Minn.	Folkert	Cirrus	310 161.73	250

**350 Cu. In. Free-For-All. 5 laps, 5 mile closed course.
Edelweiss Trophy, \$1,500**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Harold Neumann, Moline, Ill.	Folkert	Cirrus	310 166.04	\$675
J. Jacobson, Kansas City, Mo.	Howard	Gipsy	318 155.30	375
H. Mummert, Hammondsp., N.Y.	Mercury	Cirrus	302 139.83	225
C. McArthur, Tampa, Fla....	Heath	Martin	333 135.57	150
M. King, Fairmont, Minn.	Monocoupe	Lambert	266 119.43	75

**500 Cu. In. Free-For-All. 7 laps, 5 mile closed course.
Aero Digest Trophy, \$5,000**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
John Livingston, Aurora, Ill..	Cessna	Warner	499 204.54	\$2,250
Art Davis, E. Lansing, Mich..	Cessna	Warner	499 202.88	1,250
Harold Neumann, Moline, Ill.	Folkert	Cirrus	310 170.81	750
Jack Wright, Utica, N. Y....	Monocoupe	Warner	422 162.37	500
J. Jacobson, Kansas City, Mo.	Howard	Gipsy	318 157.12	250

**Unlimited Cu. In. A.T.C. 5 laps, 5 mile closed course.
Turf Catering Co. Trophy. \$1,300**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Jack Wright, Utica, N. Y....	Monocoupe	Warner	422 145.85	\$585
L. G. Larson, Wichita, Kansas	Beechcraft	Wright J6	975 143.19	325
Doug Davis, Atlanta, Ga.....	Travel Air	Wright J6	756 139.28	195
E. M. Laird, Chicago, Ill.....	Laird	Wasp	1344 135.45	130
A. J. Davis, E. Lansing, Mich.	Waco	Wright J6	756 130.84	65

**115 Cu. In. Free-For-All. 5 laps, 5 mile closed course.
Polish Trophy (2nd Heat), \$500**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Art Carnahan, Bloomington, Ill.	Tilbury-Fundy	Church	108 114.92	\$225
A. J. Davis, E. Lansing, Mich.	Heath	Continental	115 112.34	125
Willis E. Kysor, Niles, Mich...	Heath	Continental	115 90.99	75
Walter Franklin, Kankakee, Ill.	Church	Church	108 90.05	50
David H. Bishop, Chicago, Ill.	Chilleen-Fitton	Church	108 82.81	25

**800 Cu. In. A.T.C. 5 laps, 5 mile closed course.
Gov. Henry Horner Trophy, \$1,200**

Pilot and Home Field	Plane	Engine	Cu. Speed In. (m.p.h.)	Money
Jack Wright, Utica, N. Y....	Monocoupe	Warner	422 160.03	\$540
Doug Davis, Atlanta, Ga.....	Travel Air	Wright J6	756 152.89	300
A. J. Davis, E. Lansing, Mich.	Waco	Wright J6	756 142.80	180
M. King, Fairmont, Minn....	Monocoupe	Warner	422 134.94	120
H. MacCloskey, Pittsburgh, Pa.	Monocoupe	Warner	422 134.91	60



Roscoe Turner's Wedell-Williams Racer

Results of the National Air Races Los Angeles, California



Dick Whittington photos

George Hague in the all-metal Keith-Ryder Menasco-powered "Bumble Bee" monoplane with retractable landing gear; Ben O. Howard and his Menasco-powered monoplane "Mike," flown by Roy Minor; Gordon Israel and his "Redhead" monoplane powered with a Menasco engine.

Bendix Transcontinental Speed Dash

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
R. Turner, Los Angeles, Cal.	Wedell-Wms.	P. & W. Wasp	1344	214.78	\$5,050
J. R. Wedell, Patterson, La...	Wedell-Wms.	P. & W. Wasp Jr.	985	209.23	2,250

Event 2. 375 Cu. In. 6 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	164.938	\$360
S. J. Wittman, Oshkosh, Wis.	Wittman	Hermes	349	159.834	200
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	155.88	120
A. C. Chester, Joliet, Ill.....	Chester	Menasco	363	147.456	80

Event 4. 550 Cu. In. 10 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	189.625	\$900
Roy Minor, Hollywood, Cal....	Howard	Menasco	489	189.374	500
Gordon Israel, Overland, Mo...	Israel	Menasco	544	175.471	300
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	172.338	200
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	166.966	100

Event 6. 375 Cu. In. 6 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
A. C. Chester, Joliet, Ill.....	Chester	Menasco	363	146.43	\$360
S. J. Wittman, Wisconsin.....	Wittman	Hermes	349	—	200
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	—	120
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	—	80

Event 7. 550 Cu. In. 10 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Roy Minor, Hollywood, Cal....	Howard	Menasco	489	196.95	\$900
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	191.58	500
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	166.13	300

Event 8. 1,000 Cu. In. 10 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
J. R. Wedell, Patterson, La...	Wedell-Wms.	P. & W. Wasp Jr.	985	207.46	\$1,125
Roy Minor, Hollywood, Cal....	Howard	Menasco	489	174.09	625
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	165.14	375
Lee Shoenhair, San Francisco, Cal.	Brown	Menasco	544	137.52	250

Event 9. Aerol Trophy Race. 5 Laps, 10 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Mae Haizlip, Missouri.....	Wedell-Wms.	P. & W. Wasp Jr.	985	168.216	\$1,350
Marty Bowman, Burbank, Cal.	Gee Bee	P. & W. Wasp Jr.	1,344	161.708	750
G. O'Donnell, Long Beach, Cal.	Waco	Wright	756	134.004	450
H. Sumner, Los Angeles, Cal.	Travel Air	Wright	788	129.933	300

Event 11. 375 Cu. In. 6 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	168.91	\$360
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	160.363	200
S. J. Wittman, Oshkosh, Wis.	Wittman	Hermes	349	156.058	120
Art Chester, Joliet, Ill.....	Chester	Menasco	363	153.864	80

Event 12. 550 Cu. In. 10 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Roy Minor, Hollywood, Cal....	Howard	Menasco	489	193.930	\$900
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	190.896	500
Gordon Israel, Overland, Mo...	Israel	Menasco	544	174.031	300
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	172.032	200
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	160.597	100

Event 14. 1,000 Cu. In. 10 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
J. R. Wedell, Patterson, La...	Wedell-Wms.	P. & W. Wasp Jr.	985	209.886	\$1,125
Lee Gehlbach, Detroit, Mich..	Wedell-Wms.	P. & W. Wasp Jr.	985	192.93	625
Roy Minor, Hollywood, Cal....	Howard	Menasco	489	188.147	375
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	183.824	250
Gordon Israel, Overland, Mo...	Israel	Menasco	544	173.198	125

Event 16. 375 Cu. In. 6 Laps, 5 Mile Course

Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	160.128	\$360
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	159.957	200
S. J. Wittman, Oshkosh, Wis..	Wittman	Hermes	349	158.579	120
A. C. Chester, Joliet, Ill.....	Chester	Menasco	363	154.365	80

• **SHOWING** the largest profit since the boom days of 1929, the 1933 National Air Races at Los Angeles municipal airport closed at the end of a four-day show on July 4, with a profit of \$5,358.54, before taxes and contingencies were figured. One thousand dollars have been turned over to the Army and Navy Relief societies and to the Los Angeles community chest.

The last National Air Races to show a profit were held in Chicago in 1930. In that year, the 10-day air meet closed with a profit of \$3,997.15. The next two years in Cleveland, the national races ended with a loss of \$112,512.80 in 1931 and a loss of \$17,540.25 in 1932.

Total revenue during the four days this year was \$181,093.18. The expenditures of \$175,734.64 included more than \$40,000 in prize money, the largest proportion of prizes to total expenditures in the history of the National Air Races.

The expenditures this year included an

investment of \$10,000 in grandstands which has been entirely written off, while the stands themselves have been preserved for possible use in 1934 or 1935.

Total net paid attendance during the four days was 127,427 persons, averaging more than 30,000 persons daily. July 4 was the banner day, with a paid attendance in excess of 45,000. Advance ticket sales accounted for \$51,000 of the receipts.

From the viewpoint of the public, the high points on the daily programs were Major Ernst Udet, German war ace, and his three dead-stick loops from an altitude of less than 1,000 feet; Lieut. Tito Falconi from Italy and his inverted acrobatic flying; Spud Manning and his delayed opening parachute jump from more than 12,000 feet; and the Hollywood Trio, consisting of Frank Clarke, Paul Manz and Jack Rand, who did everything in the book of aerobatics and added a few new ones of their own.

Elimination of derbies and A. T. C. races did much to speed up the program and to do away with many of the problems arising in past years. Although the early date of the races this year hardly allowed time for pilots to build new special racing planes for the Los Angeles meet, concentration of all prize money on free-for-all events is expected to result in the development of new planes and engines for the Chicago races in September and for next year's national races.

The only serious accident at Los Angeles was a crash of a commercial airplane flown by a sportsman pilot in a special matched race. Fortunately, the pilot is recovering rapidly from his shanking-up. There were no serious accidents to racing pilots in the closed course free-for-all events.

The races brought out a list of new racing pilots who have now carved niches for themselves in the Hall of Flying

(Continued on page 68)

Event 17. 550 Cu. In. 10 Laps, 5 Mile Course					
Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Roy Minor, Hollywood, Cal...	Howard	Menasco	489	189.803	\$900
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	186.227	500
Gordon Israel, Overland, Mo...	Israel	Menasco	544	172.432	300
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	171.220	200
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	170.137	100

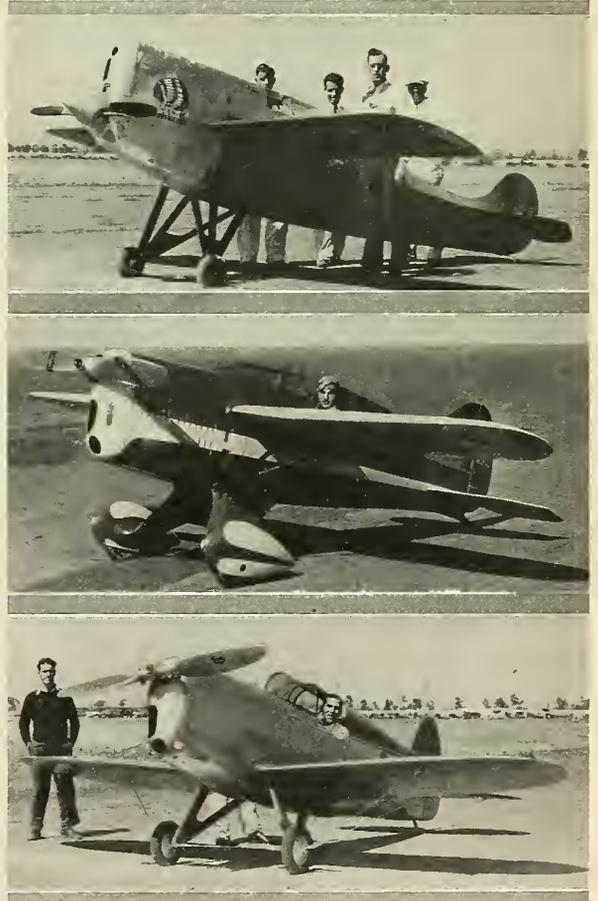
Event 18. Thompson Trophy Race. 10 Laps, 10 Mile Course					
Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
J. R. Wedell, Patterson, La...	Wedell-Wms.	P. & W. Wasp Jr.	985	237.952	\$3,375
Lee Gehlbach, Detroit, Mich...	Wedell-Wms.	P. & W. Wasp Jr.	985	224.947	1,875
Roy Minor, Hollywood, Cal...	Howard	Menasco	489	199.870	1,125
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	183.206	750
Z. D. Granville, Springfield, Mass.	Gee Bee	P. & W. Wasp	—	173.079	375
R. Turner, Los Angeles, Cal...	Wedell-Wms.	P. & W. Wasp	—	241.031	—

Event 23. Shell Speed Dash. 550 Cu. In., 3 Kilometers					
Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
Roy Minor, Hollywood, Cal...	Howard	Menasco	489	241.612	\$450
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	231.702	250
Gordon Israel, Overland, Mo...	Israel	Menasco	544	221.746	150
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	210.640	100
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	210.124	50

Event 13. Shell Speed Dash. Unlimited, 3 Kilometers					
Pilot and Home Field	Plane	Engine	Cu. In.	Speed (m.p.h.)	Money
R. Turner, Los Angeles, Cal.	Wedell-Wms.	P. & W. Wasp	1,344	280.247	\$1,125
J. R. Wedell, Patterson, La...	Wedell-Wms.	P. & W. Wasp Jr.	985	278.92	625
Lee Gehlbach, Detroit, Mich...	Wedell-Wms.	P. & W. Wasp Jr.	985	251.93	375
Roy Minor, Hollywood, Cal...	Howard	Menasco	489	241.612	250
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	231.702	125

550 Cu. In. Sweepstake Award No. 3. Events Nos. 4-7-12-17					
Pilot and Home Field	Plane	Engine	Cu. In.	Points	Money
Roy Minor, Hollywood, Cal...	Howard	Menasco	489	19	\$900
Ray Moore, Alameda, Cal....	Keith-Ryder	Menasco	544	17	500
Gordon Israel, Overland, Mo...	Israel	Menasco	544	9	250
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	9	250
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	3	100

375 Cu. In. Sweepstake Award No. 2. Events Nos. 2-6-11-16					
Pilot and Home Field	Plane	Engine	Cu. In.	Points	Money
S. J. Wittman, Oshkosh, Wis...	Wittman	Hermes	349	14	\$360
G. Hague, Santa Monica, Cal.	Keith-Ryder	Menasco	363	13	160
Lee Miles, Burbank, Cal.....	M&A Special	Menasco	363	13	160
Art Chester, Joliet, Ill.....	Chester	Menasco	363	11	80



Dick Whittington photos

Some of the new low-powered racing airplanes at Los Angeles: S. J. Wittman and his mid-wing Hermes-powered "Chief Oshkosh"; Art Chester in his cantilever braced Menasco-powered monoplane, and Lee Miles in a Menasco-powered low-wing M & A special monoplane.

Salesman... what of the prospect?

by

CHARLES J. CUTAJAR

SECOND ARTICLE OF THE SERIES ON AIRCRAFT MARKETING

● In a study of the aviation industry three years ago an eminent publishing house ventured a wee prognostication that 250,000 airplanes might be privately owned and operated within ten years from that time IF, when they lose speed the planes would "settle to the ground" without damage and IF they can be safely taken into and out of a 4-acre lot and IF a person with average mechanical training can in a short time and at small expense learn to fly and IF planes are sold at prices comparable with automobiles, considering the number of passengers and also the grade of construction.

We-e-l-l-l, every aircraft salesman longs for the day when the fabled flivver of the air will come into existence—the flying machine that a grammar school boy or a jittery old lady can step into and by pressing a button be safely wafted aloft in magic carpet style. Then airplanes will be sold by department stores, and won't the competition be terrible! For the present, alas, we'll have to plug along without miracles. Our friends in the drafting room, the laboratory and the wind tunnel are doing the best they can and a mighty good best it is. But, in the words of Arthur H. Little, "there'll be no rabbit." Airplanes are still airplanes—and current production must be sold. So let us take inventory and check over the stock on hand.

Better Airplanes Are Here

There is no question but that the airplane of 1933 far outstrips in performance and value anything that the industry has hitherto been able to offer to the private and commercial owner. The aircraft salesman has a modern and vastly improved product to sell, whether it be a sleek speedster that will cruise better than 200 m.p.h. or a 'giro with a forward landing speed of zero, a light sport job that flies for a cent a mile or a brand new amphibion with a performance that rivals most land planes.

Barring old production (the brokers report that serviceable used planes are getting mighty scarce) the following types are now available to private, business and commercial buyers.

In the preceding article it was noted—that the sale of private and commercial aircraft (transport excepted) is at low ebb—that an early recovery of the market is indicated—that recent developments should lead producers of military, air mail and transport airplanes to give some attention to the primary market for aircraft, i.e., private individuals, commercial fliers and business firms—that the present job is to sell another airplane. In this second article will be discussed the product itself and the prospective purchaser for it.

The Buyer Has a Variety of Airplanes to Choose From

OPEN AND CLOSED COCKPIT LAND PLANES

One-Place, cruising 60 m.p.h. to 135 m.p.h., \$950 to \$5,000. Two-Place, cruising 65 m.p.h. to 200 m.p.h., \$1,350 to \$20,000 (average around 90 m.p.h. for \$3,000). Three-Place, cruising 85 m.p.h. to 150 m.p.h., \$2,800 to \$16,000.

CABIN LAND PLANES

Two-Place, cruising 70 m.p.h. to 105 m.p.h., \$1,500 to \$4,000. Three-Place, cruising 100 m.p.h., \$4,000 to \$4,500. Four-Place, cruising 116 m.p.h. to 185 m.p.h., \$4,000 to \$19,000 (average around 120 m.p.h. for \$6,000). Five-Six-Place, cruising 108 m.p.h. to 125 m.p.h., \$5,000 to \$15,600. Seven-Eight-Place, cruising 150 m.p.h. to 200 m.p.h., approximately \$25,000. Ten to Seventeen-Place, cruising 113 m.p.h. to 165 m.p.h., \$26,000 to \$50,000.

SEAPLANES

Most makes of land planes, with pontoons in place of land gear. Add 20% to 25% to the prices of the planes; deduct 4% to 5% from the cruising speeds.

FLYING BOATS

Four Place, open cockpit, cruising speed 90 m.p.h., \$8,700.

AMPHIBIONS

Three- to Five-Place, cruising 94 m.p.h. to 100 m.p.h., \$9,000 to \$20,000. Eight- to Sixteen-Place, cruising 90 m.p.h. to 115 m.p.h., \$15,000 to \$50,000.

AUTOGIROS

Two- to Four-Place, cruising 80 m.p.h. to 100 m.p.h., \$4,950 to \$15,000.

There you have aviation's gift to the

nation in this year of the Great Rejuvenation. And a wary Public, convalescing from a drastic gland operation, raises itself on one elbow and wants to know "what of it?" To which, of course, there is no reply—except from a salesman. For a salesman is never at loss for a reply.

What the salesman has to say will necessarily be governed by the source of the inquiry. To the initiated, the experienced owner and pilot, the appeal will be in terms of product advancement

and competitive advantages. The salesman will feature construction, performance and power plant. He will stress stability, maneuverability and reliability. He will cover price and upkeep. He will not neglect appearance, ease of maintenance and company standing. It will not be hard for him to show that more airplane can be bought for the deflated dollar of 1933 than was ever obtainable for the gold standard dollar of the past.

The last word in open cockpit planes, delivering better than 100 miles per hour at comfortable cruising speed, can be had for one-half the price of corresponding types of the past.

A commodious four-seater cabin plane, excelling in workmanship and performance, completely equipped to the last detail can be had for a price that would have previously commanded a high type 2-place open job, or at best a cabin plane of doubtful performance and inhospitable quarters.

So on down the line, even with the present handicap of a high design cost distributed over a small current output, prices of airplanes of all types have been remarkably reduced. Commercial fliers and experienced private owners, capable of judging aircraft as the average man knows motor car values, will agree that good new airplanes are available today at low prices. Our hats off to the designers and engineers who have been steadily on the job!

Sell Airplane Ownership First—Then the Plane

To the uninitiated, representing the great potential market, the salesman will

not talk in terms of horsepower, wing loading or service ceiling, but of the uses which flying serves and the advantages of airplane ownership. He is not selling so much tubing, spruce and fabric or so many revolutions of the propeller. He is selling hundreds of hours and thousands of miles of swift, pleasurable travel. He will demonstrate economy and will be justified by the facts.

Private Flying Is Not Costly

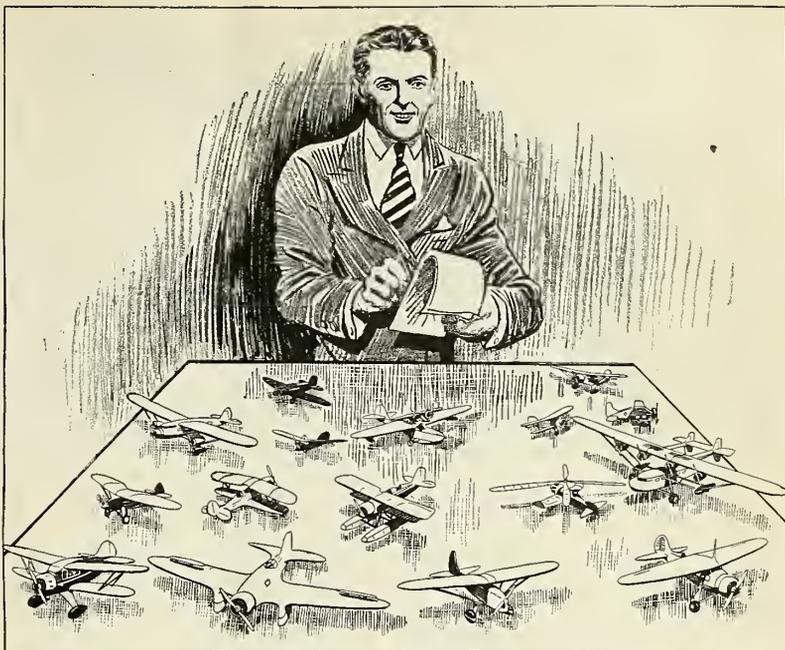
With reasonably good care a modern medium size plane will perform satisfactorily for a life of 2,000 hours in the air or 200,000 miles of travel. Distributed over a period of, say, four years, what would be the cost of such travel-service to the owner pilot, including depreciation of plane and engine? In the case of the average medium priced cockpit land plane, it would probably be 6c to 8c per mile, including fuel, oil, maintenance and overhaul, insurance, hangar rental and sinking fund. When two persons are flying the passenger-mile cost is halved. Expensive? Not by any criterion!

If you contemplate the ownership of a medium priced cabin plane seating four persons, the life of your plane will be about the same and the total cost of the travel service you purchase will average 15c per mile. Three or four persons carried and you are down to 5c and less per passenger-mile.

The medium size open and closed planes, including those equipped as seaplanes, will continue to account for the bulk of the sales to private and commercial owners. Hence the average owner is purchasing speedy, flexible travel for 6c to 15c per mile and less than that per passenger-mile if the passenger seats are occupied. The precise cost will be governed entirely by the size of the plane and the performance and comfort the owner demands.

This cost of travel by private plane compares with 2.75c per passenger mile for bus travel; 3.6c for railroad travel without pullman charges; 3c to 6c for private automobile travel; 6.5c to 7c for travel on regular air transport lines; and a still higher cost per mile of travel by motorboats and cruisers on a basis of ordinary seasonal usage. In the higher priced group of airplanes providing increased passenger carrying capacity, exceptional speeds, or special and valuable characteristics, the cost per passenger mile of travel will compare favorably at all times with that of luxurious motor cars and yachts.

Granted, that the use to which the prospective owner intends to put his plane, the amount and frequency of travel contemplated, the distances and the type of territory to be covered and every other particular of the service desired, must be gone into in each case before the



Here are airplanes for every prospect. If you're seeking variety of choice, smart performance and exceptional value, you'll have no difficulty in making a satisfactory selection from the aircraft of 1933

economies of plane ownership can be fully and satisfactorily demonstrated. Nevertheless it is well established that private flying is no longer the costly undertaking that it was during the Munificent Twenties. Fifteen hundred airports, located at almost every desired destination point, with facilities to house and service private planes at standardized rates, ease the path of the air traveller and enable him to plan his trip with predictable costs. Moreover, when considered in the light of time saved, of superior mobility, of savings in meals and overnight charges encountered in slower forms of travel, the modern privately owned airplane plainly justifies itself from a dollar standpoint in any unprejudiced mind.

How Shall the Prospective Owner Be Identified?

If then, plane ownership is warranted by utilitarian and economic considerations, what manner of man or woman is it who may be considered a prospective purchaser? Is it possible to project a composite picture of the elusive Unknown whose signature will grace the dotted line? In making the attempt let us bar for the time being the experienced pilot and owner, past and present. He is always a prospect and will buy the most performance for the money. We will also omit from consideration the army of youths who would like to own a new plane but until the industry makes it possible for them to do so will have to be content with the remnants in used plane

stocks. Where shall we look, then, for the unidentified prospect who, multiplied many times over, is to swell the ranks of the private fliers during the months to come?

Shall we consult Dun's? Club registers? Auto license bureaus? By all means. Yet it would almost seem that an excellent guide for the seeker of airplane buyers might be a Book on Character Analysis! Preposterous? Before you condemn the idea, study almost any list of airplane owners. Endeavor to trace the qualities that seem most common to them all. Is it wealth? Back in the years of great prosperity when notwithstanding present impressions almost 75% of our people lived on incomes of \$1,300 and less, more than 40% of the non-commercial owners of aircraft, according to one careful study made at the time, possessed incomes of less than \$5,000. It is true that only the wealthy will buy the bigger and more costly planes, yet the majority of monied people will *not* buy airplanes and many with modest income *will*.

Look for the Individualist

No, owners and prospective owners of private airplanes simply cannot be catalogued by any single classification of wealth, education, age, occupation, creed, color or sex. They are represented in every station and walk of life and defy identification by any handy label. Probably the most reliable common denominator would have to do with character and



Photo Courtesy the Food Field Reporter

He flies because he has to: C. J. Brand, Coadministrator of The Farm Act, commuting by plane to and from Washington and points East, West, North and South

temperament. If you are acquainted with a number of fliers, do you not find that most of them have these traits in common; the love of action and of speed; the nervous alertness of enduring youth; the enjoyment of good health; the urge to become a participator rather than a spectator; the individuality of the non-conformist?

Do not these things count beyond money or social standing? Even beyond age—a new owner at Roosevelt Field is learning to fly his recently purchased cabin plane at the adventurous age of 55—and this by no means is a precedent. Witness, the recently formed pilots' organization in New England called the Over-Fifty Club.

Whether your prospect is a blue blooded social registerite or a red blooded farm boy, a player of polo or a pitcher of horseshoes, his hand will have yearned for the control wheel before you'll ever find him, much less sell him. So get out your character analysis book, or draft the services of your personnel director, or page Dr. Gregory, unless you are an honest-to-goodness salesman and therefore a good judge of human nature. For you'll first have to learn to spot the man who would *like* to fly. Then you can check up on his bank account. You'll save more time that way than by reversing the procedure.

Where to Look for New Prospects

Of course, you must look in the likely places. You had best follow the reasoning of the man who found his straying horse by going to the place that he would go "if he were a horse." You must explore the gathering places and occupations of active, virile men and women, the classifications and groups of doers, of those who are now or are destined to be in the forefront at work and at play.

You will, of course, have already trod-

den the beaten paths. You will know the preferences and inclinations of every one of the seven-hundred-odd flying club members, of every solvent holder of a student permit, of every licensed private pilot and owner of an airplane, past and present, of the likely personnel amongst the aeronautical equipment and accessory manufacturers, the airport staffs, the oil companies.

Your files will record the activities of every commercial operator engaged in transport, school, charter, taxi or sight-seeing service, in aerial photography, mapping or crop dusting, in aerial advertising, in exhibition flying, parachute jumping, etc.

Build Your List from These Sources

Reaching out, your search will lead you to become a collector of names from many sources. You will scrutinize the

rosters of country clubs, yacht clubs, exclusive social clubs and societies, of athletic clubs, of racing, boating, fishing, hunt, shooting and other sporting groups and associations, of undergraduates and alumni of colleges and certain schools, of Greek letter fraternities, of business associations, boards and chambers, of sales executives' clubs, of patriotic organizations and American Legion posts, of persons who have chartered planes and of every *regular* patron out of the half million who use the airlines.

You will examine the various vocations for men whose working time may be freer or more flexible than the average or whose travel greater, such as professional men, officers and executives of business corporations and all other enterprises, particularly men having to do with sales or field work of any kind, of traveling buyers and estimators, of brokers and bankers, of promotion and publicity men and association secretaries, of publishers and lecturers, of engineers, of political campaigners, of men who have been drafted for governmental cooperation and supervision under the "NIRA," of successful farmers, planters and ranchers.

You will of course delve into the income tax lists and of recorded owners of property (real estate, securities, high-priced cars of recent model, boats, saddle horses, greenhouses, swimming pools, etc.) and learn how, without undue expense, to winnow the chaff from the wheat—to discover the occasional and not too frequent prospect, the man or woman who meets your "character analysis" requirements.

You will no longer neglect the substantial colored brethren, not unless you wish to miss a bet.

(Continued on page 70)



He flies because he likes to: Thomas Eastman, Governor of the Long Island Aviation Country Club at the start of the club's recent seaplane cruise at Sands Point Bath Club



Pursuit *versus* Bombardment

MAJOR GENERAL JAMES E. FECHET, U. S. ARMY (RET.)

• ALL the wars of all time have had one habit in common. After each conflict, some man representative of a group which had dash, intrepidity, and color always has seized the popular imagination.

The last war was no exception. The struggle in the clouds spawned this modern gladiator. That was because battles in the air were fought by lone antagonists. Aloft men did not maneuver in prosaic squads or commonplace battalions. Rather, they mounted their engine steeds and sought to destroy the enemy in single-handed combat. When these roaring chariots met, it made a great spectacle. As the vanquished tumbled earthward that made a romantic exit. Little wonder that your airman drew the curtain call as the leading man of that great play.

When the war was over, and we began to summarize the lessons we had learned, the better to revise our strategy, tactics and principles in preparation for the next encounter, the air fighter loomed large on the horizon. It was perceived that the flying force must be taken into serious account in building our armies for the future. That experience was repeated on more than one occasion. In short, it is now fairly generally conceded that bombers of late types are too fast for pursuit planes to bother.

The pursuit adherents said: "You must give us faster planes. Single-seaters can always be made faster than big bombers."

But if pursuit planes can be increased to speeds of three hundred fifty miles per hour, which seems not unreasonable, then they will, in order to intercept the enemy bomber and strike him by approved tactical methods, have diving speeds around 500 miles per hour. Now here comes the rub. Some mathematician showed that a pursuit pilot, traveling at that speed, would have time for only one shot from the time when he came in range until he swept past his target. With the gunner traveling at 500 miles per hour one can well imagine with what accuracy

that one precious shot would be delivered. In the meantime the pursuit plane would meet a veritable barrage which the six or eight machine guns per bomber would lay for him to fly through as he passed. Each big ship carries eight machine guns; each gun fires from 600 to 1,000 rounds per minute; there are, let us say, eighteen planes in the bombardment formation. That means that the bombers could deliver some 100,000 to 140,000 bullets per minute, thus warmly to greet the one-shot attacker.

Whispers have crossed the Atlantic indicating that England has made some tests with her Royal Air Force and reached the same conclusion, namely, "Bombardment aviation properly equipped and flown, cannot be prevented from reaching and destroying its objective."

Each weapon developed in warfare passes through the same stages as have all weapons of the past—discovery, experiment, development, supremacy, obsolescence, decadence and discard. Thus went the broadsword, battle-ax, crossbow, and muzzle-loader. May it not well be that the lone air knight is in the late stages of that cycle?

The further we go in warfare the less the individual counts. The more it becomes a matter of mass, machines, and mobilization.

But there were many types of air battleships. There were the bombers, attack ships, observation planes, and, above all, the picturesque single seater—the pursuit plane. Which of these merited the lead? Which of these should predominate in the development of the sky armada?

A few pointed out that bombers as engines of greatest destruction should be given preference. But this contention was drowned out by the shouts of the advocates of the pursuit—the air fighters. Said the latter:

"If you have pursuit dominance, bombers cannot accomplish missions; they will never reach their objectives. Therefore have plenty of pursuit to protect your own bombers, and to sweep the

enemy from the sky and you will have complete air domination."

That line of reasoning won out perhaps, because it was advanced by and in favor of the heroes of the last war. So it came about that the Army, building its air component, spent most of its money and effort in developing pursuit aviation, neglecting bombardment, observation, and attack, accordingly.

During the last fifteen years the pursuit arm has become the elite section of the Corps. Young fledglings bucked for it at our pilot schools; our best men were assigned to it as squadron commanders. These formations of single seaters got the call when air meets and public gatherings demanded to see the show troops of the Air Corps on parade.

But of late there has been a definite change of sentiment. Some tests, to try air tactics by fire, so to speak, were made and maneuvers devised to determine the relative merits of the divisions of air fighting men and ships. The results have been startling.

It now seems that pursuit planes cannot prevent bombardment planes from accomplishing their missions. In one tactical exercise a formation of pursuits dived, eighteen strong, with screaming wires and motors wide on a formation of nine bombardment planes in order to come down under the huge dynamite carriers and rise under their tails, the better to strike their least protected spots. But when the bombardment commander saw the single-seaters committed to their dive he opened up his engines, increasing his speed from about the normal 110 to nearly 160 miles per hour. When the pursuit leader rose from his dive to destroy his targets he found that they had flown over into the next county, far out of range, and when he opened up in hot pursuit, he did not have the speed to overtake his prey. They went on to their appointed targets, dropped their bombs, closed into tight protection formation, changed their altitude, and, being camouflaged, returned unobserved to their airdrome.

E D I T O R I A L S

"The crux of any successful transport system, and especially an air transport system, lies in the regularity of its schedules, the maintenance of its equipment and the development of high moral and professional caliber in its personnel."—JACK FRYE, Vice President, in Charge of Operations, T.W.A.

Lesson in the Balbo Flight

• Many words of high praise have been spoken for the precise execution of the westward flight of the Italian air fleet under the command of General Balbo. Full advantage also has been taken of the opportunity by many commentators to point out what lessons this magnificent foreign achievement means to our own aeronautical activities.

None, we believe, is so pertinent or so significant as the words spoken by Representative John P. McSwain, Chairman of the House Military Affairs Committee. Says Representative McSwain:

"No 'round-the-world trip of any warship or fleet has ever impressed the people of the whole world as this spectacular flight of 24 planes. America, the home of aviation, should not ignore the lesson. Undoubtedly we are neglecting aviation. We are starving our manufacturers, we are neglecting our personnel and deliberately refusing to organize our forces."

We congratulate Mr. McSwain upon the clarity of his vision in seeing the real lesson for America in the splendid flight of General Balbo and his Italian compatriots. We particularly applaud the extension of his remarks upon this subject when he says, "A separate department of aviation in command of all our military air activities and training is the answer."

The reiteration of this suggestion is extremely important because it comes at a time when three secretaries in the cabinet of the new Administration are drifting into one of those typical inter-department ding-dong battles from which no one suffers as much as American military aviation. It has ever been so. At the moment we find Public Works Administrator Ickes opposing the suggestion of Secretary of War Dern in his request for funds for the further mechanization of the Army and the building up of the air corps strength to 1,800 planes. And while these two officials engage in their little inter-departmental squabble, that master politician now at the head of the Navy, Secretary Claude A. Swanson, sails merrily on to a new naval victory with an appropriation of \$238,000,000 out of the public works fund for new naval construction. We applaud Mr. Swanson's astuteness and his loyalty to the department to which he has been attached. But the fact remains that military aeronautics

will continue to be the neglected step-child as long as such squabbles and tactics are the order of the day. We still have to learn the real lesson of the Balbo flight.

Encourage Our Young Engineers

• Experience, the magic sesame which opens the door of the industry, is not easy for younger members of the engineering fraternity to acquire. Few aircraft manufacturers are willing to take a man in while he is still a student, train him in practical applications of his knowledge, acquaint him with factory organization, give him an opportunity to know "the shop" and teach him the value of team work. A young engineer lucky enough to obtain a position after graduation, usually goes through a painful process of wasteful readjustment. This unnecessary ordeal could be spared if the man were given proper training while still in school.

In justice to our aspiring aeronautical engineers and the industry which is to receive them, various companies could institute a plan to take on and train students during their summer vacation period, paying them a nominal living wage. Three or four such periods should be spent in various departments with particular stress on shop work.

Train the student in the manufacturing phase of the work which no university or school can properly teach. Let him get the viewpoint of the men in the shop; let him see the transformation from blue prints to finished parts, and learn how these parts make up an airplane.

Our engineering societies should work out a program of desirable training and negotiate with manufacturers to establish the quota of summer students to be trained, thereby giving a talented junior member an opportunity to find his place in the industry.

Wiley Post's Solo Flight

• In contemplating the spectacular revival of special flight activities which occurred in the month of July, we are reminded of information which came to us through extra-official press channels during the course of the Balbo flight. Without seeing them, we can well imagine the space devoted in the Rome and

other Italian newspapers concerning the activities of Balbo and his men on their historic flight. But the special bit of information which has come our way is that, while the Italian newspapers did not neglect to chronicle what the fliers were actually doing, by far the largest portion of Italian newsprint was devoted to recounting what Americans thought of the feat, and the direct quotation of columns and columns of American editorials and speeches on the flight.

In evaluating the splendid achievement of Wiley Post's record-making flight from New York to New York we urge men in American aviation to study the outpouring of comment and appraisal for Post which appeared in the American press. From coast to coast there has occurred a flood of written discussion and comment upon the perfection of the mechanical side of this achievement, which is of untold value to aeronautics.

In extending AERO DIGEST's congratulations to Mr. Post, we can not refrain from remarking for the record that not the least of the benefits of his daring undertaking is the revival of a genuine mass interest in, and enthusiasm for, flying. The value of this will not be lost.

Business Needs Air Transport

• On July 1 air mail contract compensation was reduced twenty-five per cent.

In explaining that this reduction was necessitated by reduced Federal appropriations, officials of the Post Office Department, in a mild, buck-passing manner, intimate that the fate of the United States air mail service under the economy program lies in the hands of Director of the Budget Lewis Douglas.

The significance of this gesture should not be overlooked. The arguments against even the mildest of indirect government subsidies must of necessity be different in bad times from those presented in good times. Other reasons than mere economy must be used in good times in objecting to all-essential government aid to such a new science as aeronautics. The need for Federal economy today is universally recognized. It would therefore seem to be a simple matter for a disinterested Post Office Department to declare that the entire matter is in the hands of Director of the Budget Douglas. Every one knows that Mr. Douglas's

(Continued on page 68)



Personalities

by Caldwell

ON MAY 7, 1933, there occurred in widely scattered parts of the globe various natural phenomena which baffled the scientists of all nations. There was a volcanic eruption in the Coco Islands, a tidal wave in Madagascar, a glacial slide in the Yukon and a rise in the price of ham in the Sandwich Islands. Furthermore, on that day neither Huey Long nor Adolf Hitler made any remarks for publication; and Vice President Garner, who hadn't been seen nor heard of since March 4, came out of a house on Pennsylvania Avenue, saw his shadow, and went in again. All of which gave rise to various scientific conjectures, which undoubtedly would have remained mere guesses, had not this old investigator suddenly hit upon the real meaning of these natural and unnatural phenomena on May 7. It was, he discovered after long research, the twentieth anniversary of Capt. Russell Holderman's first solo flight at Mineola, L. I., in 1913, when Russ was but a youth of 18.

Since that shaky start more than twenty years ago Russ has advanced to the dignity of over 6,000 hours in the air and to the presidency of the D. W. Flying Service at Le Roy, N. Y., where the youth of the land may receive flying instruction at the first Government-approved flying school in the East, located on the finest private airport in America, and probably in the world. Furthermore, when the young man gets to Le Roy he will find absolutely nothing to distract his mind from flying. As an old searcher after distractions, I can swear as a result of personal investigation that nothing in Le Roy will shake anyone's equanimity. It is a homelike little town of 5000 souls, all of whom are sound asleep by 9 p. m. Russ himself sometimes sits up until 10 on a Saturday night, waiting for the bath water to get hot. But outside of that, he leads a quiet life.

Russ Holderman was born in Buffalo on Feb. 26, 1895, and his folks hoped he'd amount to something, such as being a motorman on the electric line to Niagara Falls. But his family moved to New York City, and Russ went to school in the Bronx, after which almost anything could happen. The unsettling effects of life in the Bronx, where Al Williams also was raised, soon began to assert themselves. Russ was observed

cutting out newspaper clippings about the Wrights' early experiments, and watching at the Battery when Wilbur Wright first flew up the Hudson from Governor's Island, Oct. 4, 1909; and again when Glenn Curtiss made his flight from Albany to New York, May 31, 1910. He was also seen hanging around Fred Schneider's aircraft factory at 187th St., and the first air meet at Morris Park in 1908; but nothing was done to restrain him, so that winter he and a chum built a glider in the cellar. He was now well on his way to become a pilot, and after that nothing could save him. Not even the crash of the glider, which was pushed off an eight-foot embankment early one



Russ Holderman

spring morning with Russ aboard, to descend to the bottom and thus enable him to sprain his ankle among the wreckage.

From gliders to model building was but a step, and Russ made it, winning a model contest and a fifteen-minute flight over Nassau Boulevard with George W. Beatty. In 1912 Russ had advanced far enough in aviation to smash up a glider built by John Wittemann, and also his collarbone and three ribs. Recognizing his flying ability and enthusiasm, his friend Schneider allowed Russ to work with him at Mineola, where Herman Ecker was instructing. On that fatal May 7, 1913, the boy aviator went solo,

but struck a snag. His parents objected to the wear and tear on his frame that his flying had awarded him so far; therefore they refused to sign a waiver, and as he wasn't of age, he was grounded. He immediately went into dare-devil motorcycle racing, which is probably more dangerous than even the early flying was, and smashed up several times, just to keep his hand in.

He enlisted in the Aviation Section of the Signal Corps in 1916 and during the war received a commission and instructed at Hazelhurst Field, Mineola. After the Armistice he flew on the air mail experimental service between New York and Washington; and when the New York-Chicago route was started in 1920 he became manager of the terminus at Mineola. He resigned from the mail service to operate the Queens Village Air-drome, flying passengers and instructing there during the summer. In winter he barnstormed through the South. At Daytona Beach he piloted a plane in the first automobile-to-plane change—and today if one of his students pulled off the same stunt he'd have the lad's scalp hung up in the flight office as a warning to all evil-doers. That's how much aviation has changed in ten years.

In 1927 Russ Holderman joined the Rogers Airlines of Miami and flew to Havana and the West Indies. The following year he met Donald Woodward of the Le Roy family that made a fortune on Jell-O. Mr. Woodward bought a Fairchild cabin plane and hired Russ Holderman to pilot it for him. And that's how the D. W. Airport and the D. W. Flying Service came into being. Incidentally, it was Mrs. Holderman, herself a glider pilot and holder of the world's glider endurance record for women, who was in charge of that Fairchild monoplane which was on exhibition in Miami's Everglades Hotel. She sold it to Mr. Woodward, so that's another case where a clever woman started something. The Flying Service now has three Wacos, two Fleets, two Stinsons, two gliders and one each of the following: J-6 Curtiss Robin, Fairchild, and Loening amphibion. The school's record for students passing the Department of Commerce license tests during 1930 and 1931 was 99%. Under the personal supervision of Russ Holderman it is one of the finest schools in the country.

• SLEUTHING in the vicinity of Bay City, Mich., Operative V 32 of the Caldwell Secret Service and Deplorable Details Corp., in private life a scrivener who rejoices in the classic name of Virgil La Marre, which is probably a *nom-de-plume*, V 32 sends me a few facts about one John Carrolton Barstow, the gentleman with the studious look, the glasses, and the thinning hair plastered down on his head, as per photo. Don't let Mr. Barstow's appearance fool you; he is not a deacon in the local Methodist Church, as you might surmise in spite of the leather coat. He is an airplane pilot, a glider pilot and a former daredevil motorcycle bug. You'd never think it to look at him. But then, to look at Col. Roscoe Turner in his Betsy Ross Corps uniform, you'd say at once that he was a lion-tamer with Ringling's Circus. You can't tell about people to look at them. I, for instance, am said to have a "fighting face," yet I'm mild as a dove, as Hiram Bingham and the N. A. A. will tell you.

Jack Barstow was born at Midland, Mich., Dec. 19, 1906. His father was (and still is) chief chemist of the Dow Chemical Co. at Midland, though of course he hadn't devoted all of his time to chemistry. Jack spent his boyhood in Midland, graduating from high school at the age of 18, and continuing his education with several motorcycles and a racing Ford, seeing how quickly and how completely he could disassemble them during a race. He found that he could take any wheeled vehicle apart in practically no time, with a little assistance from a fence or a telephone pole. Upon learning this, he lost interest in racing and turned his attention to the air.

Early in 1929 he enrolled for a complete Transport and Ground Course at Airtech, Lindbergh Field, San Diego, where, among other curiosities of the California climate, he encountered Hawley Bowlus and a glider. To be bitten by either Hawley Bowlus or a glider has proved the undoing of any number of young men. Jack Barstow was no exception. Standing near Hawley's glider one day, it reached over and bit him, upon which he became infected with the gliding virus, a large, winged bacillus on the end of a piece of shock cord. Instantly Jack leaped into a glider, soared aloft, and announced to his insurance company that from then on he might be regarded as a doubtful risk. He learned to glide well enough to enter the Western Glider meet at Hollywood Riviera in December, 1929, and won first place for distance and duration, beating a field of fifty contestants.

Meanwhile Bowlus had formed a glider school with about thirty students, hiring Forrest Heiatt as primary instructor and Jack Barstow as advanced soaring instructor. In February, 1930, Jack accompanied Hawley Bowlus and

Colonel and Mrs. Lindbergh to their first mountain gliding camp. After one week the party returned to San Diego, probably to rebuild the gliders. Early in March they went after the art of gliding again, this time with only Barstow as instructor, but with an Army division of photographers and reporters to remind the Colonel that any bad landing would be front-page news. It was probably the most nerve-wracking condition under



Jack Barstow

which anyone ever tried to learn gliding. There were reporters lurking behind rocks, trees and bushes, and hiding under things. One time the Colonel turned over a stone, looking for bait to go fishing with—and there were two reporters, disguised as angle worms; he caught a perch with one and a lake trout with the other. Another time the Colonel came down and landed on what he thought was a grass spot; it turned out to be six photographers, lying on their backs and reading copies of the *American Mercury*, with green covers.

Of course, glider flying and instruction was merely an interesting sideline; Jack was still enrolled at Airtech, toying with the roaring, snapping and occasionally coughing and stuttering motors. During the forenoon of April 29, 1930, to rest himself from airplanes, Jack took off from Point Loma, San Diego, in a Bowlus Sailplane and forgot to land for 15 hours and 12 minutes. This flight won him the Edward S. Evans prize of \$2,500 for the first American pilot in an American-built glider to remain in the air over ten hours; and \$100 additional for each hour over ten. Though he won the prize, his flight did not constitute an official record, as he had carried no barograph.

On May 4, 1930, he again took off, this time with two barographs and provisions, intending to remain up for twenty hours. After eight hours of soaring, rain began to descend, but Jack refused to do so. He kept on soaring, encountered a line squall that registered 60 m. p. h. on the anemometer at Lindbergh Field, and rode for a quarter of an hour before the wind, which had a tendency to roll the glider. The turbulent air finally caused one of the ailerons to tear loose, and sent the glider crashing on to the side of a can-

yon slope. Searchers found him lying badly injured in the wreckage of the craft, and carried him to a hospital, where he spent the next three months growing together again and pondering Shakespeare's remark that "when dark clouds appear, wise men put on their cloaks," and desist from soaring. Incidentally, if my friend Gus Haller had devoted more time to a study of Shakespeare he might be ahead one glider. At Elmira last month he was one of three non-Shakespearean glider scholars who had themselves towed by airplane into the path of an approaching storm. The storm entered into the rough and ready spirit of the game, playfully wrenched the wing from Haller's glider and sent that startled young man hurtling earthwards surrounded by fragments of his disintegrating craft. Considerably disgruntled, Mr. Haller brushed bits of glider out of his hair and reached for the rip cord of his parachute, which opened just in time to save another glider pilot for democracy. Leaving Mr. Haller pensively rubbing his landing gear, let us return to the storm-tossed Mr. Barstow.

Jack graduated from the hospital and later on from Airtech, in May, 1931, taking delivery of a Great Lakes plane equipped with special tanks and streamlining for long-distance racing. He won a couple of small races for planes of that class, attempted a forced landing in a small field 6,000 feet above sea level, and actually landed in a Los Angeles hospital, at sea level. The Great Lakes had been disassembled into its constituent elements through its undercarriage's striking telegraph wires on the edge of the field; so when he was asked how he got to the hospital, Jack said that he was sent by Western Union.

After four months in the bonehead repair department, this martyr to the cause of advancing science returned to Midland, bought a Model S Stinson, equipped it with blind-flying instruments and a set of curtains to exclude all vision, and now flies about in what practically amounts to a coma. He will be all right until he meets some other enthusiast, such as Howard Stark, doing the same thing in the air. Will Howard Stark please write and enlighten me on this feature of his noble specialty? What happens when Greek meets Greek and they've both got their eyes glued on the bank-and-turn indicator? Sometimes I'm glad I stopped flying before the Age of the Specialists; the boys have made it all too deep for me.

Jack Barstow is a specialist on dead-stick landings; he practiced after that telegraphic disaster, and now he can land on a dime, only who's got a dime these days? Last year at the National Air Races he took several prizes in dead-stick competitions, and has placed first in several Michigan State meets in 1931 and '32. He flies and works for the Dow-metal Division of the Dow Chemical Co.

The New Goodyear Hydraulic Airwheel Brake

makes good on the big tri-motor Fords of

NORTHWEST AIRWAYS!



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NORTHWEST AIRWAYS, INC.

EXECUTIVE OFFICE
HOLMAN MUNICIPAL AIRPORT
SAINT PAUL, MINNESOTA

June 16, 1933

Mr. L. C. Guinther
Goodyear Tire & Rubber Co.
Akron, Ohio.

Dear Mr. Guinther:

This is to inform you of our complete satisfaction with your Airwheels "plus" Hydraulic disc brakes.

This equipment was installed on one of our Ford Tri Motors five months ago, so well pleased were we with their performance, that we are ordering Goodyear Airwheels and the hydraulic disc brakes for the entire "fleet."

This we feel is in keeping with our policy of the "Best and modern equipment for the comfort and safety of our passengers."

We wish to thank you for your kind cooperation during the above installations.

Sincerely yours

J. B. LaMont
NORTHWEST AIRWAYS, INC.,
Supt. Maintenance,
J. B. LaMont

TELEPHONE RIVERVIEW 4800

UNITED STATES AIR MAIL—EXPRESS—PASSENGER SERVICE

ANYONE who reads the facts about Goodyear's new Hydraulic Brake for airplanes can see why air transport lines welcome this new equipment. By actual test they find that this new brake delivers—

400% more braking area than a comparable size band type brake—

95% of the power you apply to the brake pedal transmitted to the brake unit—

Operation with only 25% of the oil pressure needed for hydraulically operated band brakes—

Smoothness — reserve power — non-fading — instantaneous release at all times!

No wonder this new Hydraulic Disc Brake is rapidly being added to Airwheel Tires as regular equipment on the planes of the leading air transport lines. How about you? For full details write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

THE GREATEST NAME IN RUBBER

GOODYEAR

WHEN YOU BUY A NEW SHIP SPECIFY GOODYEAR AIRWHEELS AND THE NEW GOODYEAR BRAKE

. AIRLINES and AIR TRAVEL .

June Traffic Shows Great Improvement

RECORD figures both for efficiency of operation and for traffic volume have been reported for June by several important airlines. All three transcontinental airways have announced large gains during the month. American Airways set an all-time traffic record with 14,405 passengers in June, and the total of 34,073 pounds of express carried during the month established a new high record in that field. Transcontinental & Western Air completed 100 per cent of its scheduled mileage in the region between San Francisco, Los Angeles and Kansas City, and the entire system reported a completion of 99.99 per cent of the scheduled mileage. A new high mark was reached by planes of United Air Lines, which carried 13,170 revenue passengers during the month.

Each of the last four months have set records for passenger traffic on Eastern Air Transport. In June 7,762 persons were carried on the lines of the company, as compared with 2,975 in June, 1932. A completion of 100% of the 232 trips regularly scheduled for Pennsylvania Airlines during June was announced. In addition, frequent extra sections were flown to meet heavy passenger demand. A total of 1,310 passengers were carried during the month, twenty per cent over the previous high traffic point, and air mail carried totaled more than eight tons, a new record. Express and freight also established a new high mark, with a total of two tons.

Air express business over the 12,500-mile air transport lines system of the Railway Express Agency, Inc., increased by 204% in shipment units in June over the same month last year and by 7.5% over May, 1933.

More Boeings Ordered by United

CONSTRUCTION of fifteen additional three-mile-a-minute Boeing 247 transports of the kind now operating on the twenty-hour coast-to-coast service of United Air Lines has been authorized at the plant of the Boeing Airplane Co., according to an announcement by President P. G. Johnson. This brings the total number in production for United Air Lines and for sale to other air transport operators to seventy-five.

Outstanding success of the new ten-passenger carriers in the service of United Air Lines led to authorization for the additional planes, Mr. Johnson stated. Like the last thirty being delivered to United, they will be equipped with Hamilton Standard two-bladed controllable-pitch propellers, which, tests have shown, substantially improve the take-off of the ships, rate of climb and cruising speed. It is expected that they will be completed

by the end of the year. As of July 1, thirty-eight of the transports had been delivered to the various routes of United Air Lines.

National Parks Line Extended

BY THE OPENING of the new 108-mile extension to Havre, Mont., of the National Parks Airways, Inc., that city is placed within less than twenty-two hours from New York, N. Y.; 16 hours 50 minutes from Chicago; 26 hours 10 minutes from Dallas, and 12 hours 50 minutes from both San Francisco and Seattle.

Frequent New York-Chicago Trips Daily

ELEVEN daily multi-motored round-trip schedules are now operated between Chicago, Toledo, Cleveland and New York by United Air Lines, and all but one of the trips are maintained with the new high-speed three-mile-a-minute Boeing transports.

With three round-trip daily schedules between Chicago and the Pacific coast, permitting the same number of through coast-to-coast services, gains in traffic have necessitated the addition of another round trip between Chicago and Salt Lake City.

Oklahoma City—St. Louis Fare Cut

REDUCTION of fare over Transcontinental & Western Air, Inc., between Oklahoma City and St. Louis, Mo., has been announced by J. B. Taylor, division passenger agent. The reduction is a "point-to-point" cut and does not affect other points upon the national network.

Trans-Atlantic Airline Route Approved

A SATISFACTORY AGREEMENT was reported reached regarding details of the proposed North Atlantic transoceanic air route following an international conference last month. The projected airline route is the one in which Col. Charles A. Lindbergh and Mrs. Lindbergh are engaged in surveying. The conference was conducted by representatives of Pan American Airways, the Newfoundland Government, Imperial Airways and the Civil Aviation Branch of the Canadian Department of National Defense.

Eastern Air Improves Service

BEGINNING July 1, Eastern Air Transport has been operating ten round trips daily between New York and Washington, D. C., five of them non-stop express schedules. Only Curtiss Condors are used on these trips. The airline also has increased its service to Atlantic City, N. J., with two additional schedules from New York and the inauguration of a Philadelphia-Atlantic City service. An all-Condor schedule has been instituted between New York and Atlanta, Ga.

Night Plane Berth Service Inaugurated

THE FLYING sleeping berth made its advent recently on the night planes of American Airways between Cleveland, Ohio, and Los Angeles, Calif., on the company's southern transcontinental line.

The berths, made by folding two of the plane's soft-cushioned chairs, form a horizontal cot. These cots are then made up with linen and blankets by the co-pilot. Each of the tri-motored planes accommodates six sleeping passengers. The transcontinental passengers who have tried out the new flying berths are reported to have been enthusiastic over this innovation in air travel.

According to L. B. Manning, chairman of the board of American Airways, it is planned to have sleeping planes in operation on American Airways' transcontinental line within a year's time that will be equipped with built-in berths as comfortable as a Pullman. Private dressing rooms will be provided at the airports, and passengers will board the planes ready to retire.

Beacons Prepared for Night Operation

IN ORDER to make possible twenty-four-hour airline service between New York and Buffalo, N. Y., installation of beacon lights between the two cities is being rushed to completion by American Airways and will be ready for night operation on August 23, L. D. Seymour, president of the company, has announced.

Work of lighting this section of American Airways' New York-Chicago route has been under way for about three months and will represent, when completed, a total outlay by the company of approximately \$100,000, Mr. Seymour said. Twenty-four-inch beacons of 1,000-candlepower each extend from Marilla, N. Y., just east of Buffalo, to Martins Creek, Pa., from where the route follows Government-operated lights to the Newark airport. Twenty-three of these beacons are spaced approximately 12½ miles apart, although each, under normal conditions, is visible from twenty-five to forty-five miles. Of the twenty-three beacons, eighteen will operate on current generated by commercial power companies, and five will include complete gasoline-actuated generators to supply their own electricity.

United Pilots Win Promotion

JOHN HERLIHY, pilot on the Cleveland-New York division of United Air Lines, has been advanced to the position of assistant general superintendent of the N. A. T. division, and W. D. Williams, one of United's million-mile fliers, has been made assistant chief pilot for the eastern lines of United.

(Continued on following page)

BELLANCA

TRANSPORTS AND FREIGHTERS



THE AIRCRUISER — FROM THE "OFFICE"

WHEN governments go shopping, they have all the data before them—facts, figures, flights. On the basis of the exhaustive Wright Field tests the U. S. Army Air Corps recently bought 14 Bellanca Aircruiser Transports.

What Uncle Sam wants in an airplane is what every sound airman wants—whether operator, passenger or pilot. Make your checks. Set up your comparisons. List your requirements. Only BELLANCA can satisfy them all. Operating economy. High speed and maximum load with minimum horsepower. Maximum strength with minimum weight. Comfort and roominess in cabin. Smooth riding and absence of vibration. High weight carrying capacity.



The Bellanca Aircruiser is a magnificent proof of Bellanca superiority. Sturdy as an oak in construction, its low drag, its automatic air stabilization, its high power reserve, its instant control response, its unusual safety features are the pilot's right—the passenger's expectation. The Aircruiser is available as a transport or freighter. The transport is twelve to fifteen place, with the many Bellanca features for comfort and convenience. Over-all operating cost is $1\frac{1}{3}c$ per passenger mile. The freighter has a payload capacity of 4920 pounds, with over-all operating cost of 10c per ton mile.

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE
BELLANCA AIRCRAFT OF CANADA, LTD., MONTREAL

(Continued from preceding page)

Airlines Continue Gains in May

A TOTAL of 38,543 passengers was carried in May by scheduled airlines operating in continental United States, according to reports from the twenty-six companies operating during that month, it was announced last month by the Aeronautics Branch of the Department of Commerce. This indicated an increase of about 9,000 over any other month of 1933. These scheduled airlines also flew 4,079,091 miles, carried 122,414 pounds of express and flew 12,629,025 passenger miles during May.

Comparisons with March and April, next highest to May in operation figures for 1933, are as follows:

	March	April	May
Passengers carried.....	24,945	29,557	38,543
Express carried (lbs.)...	124,454	111,630	122,414
Miles flown	3,662,432	3,764,901	4,079,091
Passenger miles flown..	8,070,085	9,365,325	12,629,025

TWA Opens New Cross-Country Service

TRANSCONTINENTAL & Western Air doubled its passenger and express facilities serving the west coast last month, when several new schedules went into effect. Unprecedented air travel has justified the increase, according to H. W. Beck, traffic manager.

A new, fast, direct, nightly service both to and from New York is operated under the name "Sky Chief," which makes direct connections at Los Angeles, Calif., with new north- and southbound schedules serving San Francisco, Fresno and Bakersfield. These arrangements place eastern and middle-western points within one overnight flight from California, and give through coast-to-coast air service for passengers to or from San Joaquin Valley points.

The Sky Chief departs from Grand Central Air Terminal at 7:30 p. m., arriving at Albuquerque, N. M., at 2:27 a. m.; Amarillo, Tex., at 6:11 a. m.; Wichita, Kans., at 8:57 a. m.; Kansas City at 10:45 a. m.; St. Louis, Mo., at 1:10 p. m.; Pittsburgh, Pa., at 7:58 p. m.,

and New York at 11:07 p. m. Eastbound passengers from San Francisco will leave there at 4:15 p. m.; Fresno at 5:30 p. m., and Bakersfield at 6:20 p. m., arriving at Glendale at 7:08 p. m. Those for Oklahoma City and Tulsa, Okla., will make connections in Amarillo which will place them at their destinations before 10 a. m. Passengers for Chicago will arrive at 3:45 in the afternoon following departure. Westbound, the Sky Chief departs from New York at 9:30 a. m. and Kansas City at 9:25 p. m., arriving at Los Angeles at 11 a. m.

The development of the new night passenger and express service between San Francisco and New York via Los Angeles is an outgrowth of the air mail schedules over the same route which went into effect last February.

TWA Increases California Service

TRANSCONTINENTAL & Western Air added two more schedules to its Los Angeles-San Francisco service, starting last month. The new northbound flight departs from Grand Central Air Terminal at Glendale at 3:30 p. m., arriving at Bakersfield at 4:20 p. m., Fresno at 5:15 p. m., and at the San Francisco Municipal Airport at 6:35 p. m. Southbound, the plane leaves San Francisco at 9:30 a. m., arriving at Fresno at 10:40 a. m., Bakersfield at 11:30 a. m., and Glendale at 12:23 p. m. These additional schedules create a triple service each way daily between Southern California and the San Francisco Bay district via the San Joaquin Valley. Four of the six schedules connect in Glendale with schedules operating in both directions between Los Angeles and New York.

Shell Awarded Airline Contract

THE SHELL Petroleum Corp. has secured a contract with American Airways, Inc., for delivery of 2,600,000 gallons of aviation gasoline this year, it was announced recently by the corporation's aviation department. American Airways

contracted for this amount of gasoline to cover the requirements of a major portion of its central division, as well as those of its newly acquired company, the Transamerican Airlines Corp. This is the third consecutive yearly contract that American Airways has awarded to Shell Petroleum.

North American Forms Operations Group

AN OPERATIONS committee of North American Aviation, Inc., has been announced by E. R. Breech, president of North American, and R. W. Robbins, president of Transcontinental & Western Air. The committee, composed of Harris M. Hanshue, president of Western Air Express; J. L. Maddux, vice president of TWA, and Harris W. Beck, traffic manager of TWA, is a move toward the adoption of the General Motors' policy of decentralization and the placing of responsibility and authority upon local executives in its operating properties.

Western Air Speeds Up Schedules

LOS ANGELES and Southern California are as close to fifty cities in twenty-five states in the Midwest and central-northwest part of the United States as are Chicago and New York by fast passenger train, following the establishment of new schedules by Western Air Express to Salt Lake City, Utah, and fast connecting carriers from there to the north and east.

Air passengers, air mail and air express leave United Airport, Los Angeles, over Western Air Express at 7 a. m. and reach Chicago that night at 11 p. m. (Pacific Coast time). Another eastbound daily schedule is also afforded, leaving United Airport at 5:45 p. m. and delivering its cargo in Chicago the next morning at 9:35 a. m. (Pacific Coast time). Air mail and express shipments from the Great Lakes region and Chicago also leave on three fast schedules daily for delivery in Los Angeles and Southern California.

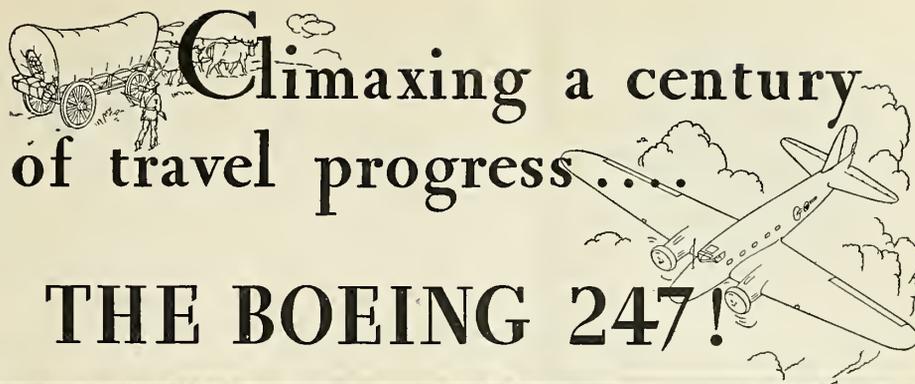
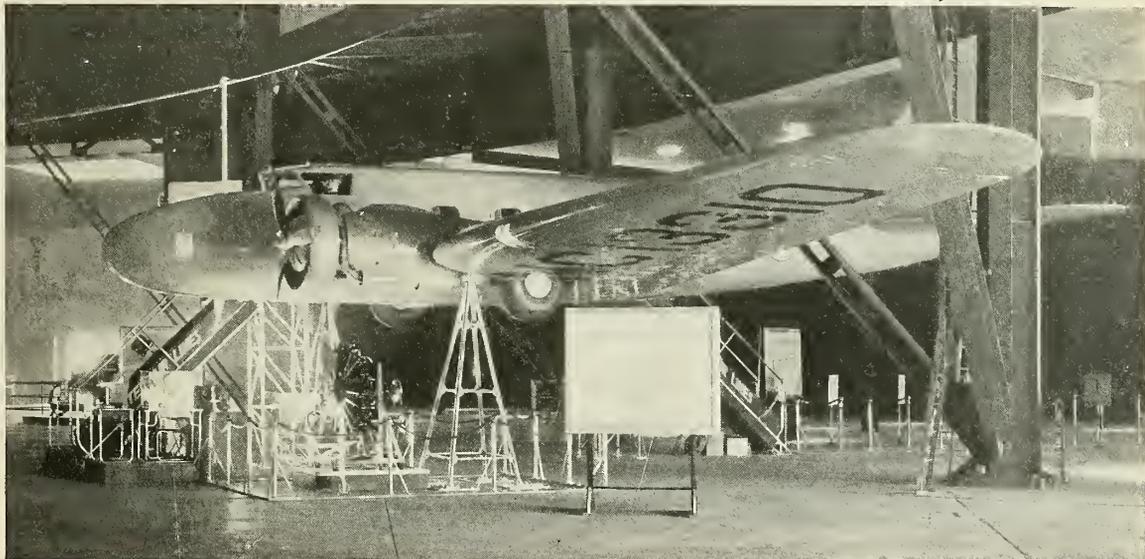


Wide World photo

Twin-engined low-wing Douglas all-metal transport monoplane constructed for TWA transcontinental service. This ship has a length of 60 feet, wing span of 80 feet and passenger-carrying capacity of twelve to eighteen

Climaxing a century
of travel progress . . .

THE BOEING 247!

What could be more representative of the last word in transportation than the new "three-mile-a-minute" ten-passenger Boeing 247? . . . That is why it is on display in the dome of the Travel and Transport Building at the Century of Progress Exposition in Chicago. . . . Specifications of the 247 sent upon request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



BOEING *has always built
tomorrow's airplanes today!*

PRIVATE FLYING

National Air Pageant Plans Announced

SPORTSMEN PILOTS will compete for national championships and a cash purse of \$10,000 at the National Charity Air Pageant, to be held at Roosevelt Field, Mineola, L. I., N. Y., October 7-8, it has been announced by the United States Amateur Air Pilots Association, sponsors of the events. Mrs. Charles Cary Rumsey, founder of the Junior League, has posted \$5,000 and the Women's National Championship Trophy, both to be awarded to the woman selected as America's foremost non-professional woman flier. Dr. E. A. Campbell has posted a similar purse and the Men's National Championship Trophy as prizes for the men's division.

Other awards will include trophies and cash prizes for winners in the men's and women's divisions of the national bomb-dropping contest, the Texaco Trophy in the international inter-club relay race, and the *Scientific American* award, silver trophies for the man and woman who have made the greatest improvement in their airplanes, since purchase, from the viewpoints of safety, performance over manufacturer's specifications, and science.

The flying program, in addition to the events restricted to sportsmen pilots, will incorporate an air demonstration by planes of the Army, Navy and Marine Air Corps, which part of the program is being developed by Major-General James E. Fechet. Other features that are planned include an aerobatic exhibition by Capt. Alford J. Williams, an attempt at an amphibion record by Maj. Alexander P. de Seversky, motion picture stars in their own airplanes, and ground events.

As announced in the July AERO DIGEST, the four-day "On-To" treasure hunt cruise, beginning at St. Louis, Mo., will end at New York, N. Y., on the opening day of the pageant. A silver punch bowl and tray will be awarded to the winner, and \$1,918 in cash prizes to those who attain the first twenty places in the cruise, to be held under the auspices of Bernarr Macfadden.

Instead of choosing participants in the national events of the pageant by means of earlier air meets for sectional championships, as was originally planned, entrants will consist of sportsmen pilot members of the U. S. Amateur Air Pilots Association who rank highest in certain qualification tests in each state. In all the championship events it is necessary for contestants to qualify for entry before September 10. Arrangements will be made by the Association for the non-professional pilot to enter these qualifying rounds at an airport near his home city. The four men and four women who secure the best score in each state will

be eligible to enter the national championship events.

These qualifying tests follow very closely the Department of Commerce flight tests for a transport pilot license. Five out of the six tests will be spot-landing demonstrations, and the sixth will involve general handling of an airplane in the air and on the ground.

Qualifying tests for entry in the national bomb-dropping contests may be taken at the same time that other contestants are giving the flying demonstrations, or both types of tests may be undertaken on the same date. The two men and two women who make the best score in each state are eligible for the national competition in bomb dropping.

In addition to the U. S. Amateur Air Pilots Association and the Sportsman Pilot Association of America, sponsors of the national meet include the Judson Health Center, the Emergency Exchange Association and the Junior League Chapters. These charity and welfare organizations will participate in the profits of the pageant.

Captain Williams will be director of events; F. William Zelcer, assistant director; John S. Reaves, managing director; Rex L. Uden, assistant manager.

Mrs. Franklin D. Roosevelt, who will be honorary chairman of the pageant, will be assisted by Mrs. Rumsey and Dr. Campbell as national vice chairmen. Other members include Mrs. Arthur B. Claffin, Mrs. Curtis B. Dall, Mrs. Eugene W. Ong, Mrs. Charles Shipman Payson, Mrs. Caspar A. Whitney, Mrs. Payne Whitney, Mrs. August Zinsser, Mrs. Henry L. Doherty, Mrs. Duke Biddle, Mrs. Culver McWilliam, Mrs. T. Raymond St. John, Miss Lila A. Stewart, John D. Farnham, Courtland T. Hill, C. M. Penfield, Philip Hiss and Mr. Reaves.

The Davisons Arrive in Africa

F. TRUBEE DAVISON, former Assistant Secretary of War for Aeronautics, and Mrs. Davison were reported last month to have arrived at Nairobi, Africa, after an air trip from Cairo. They were to be joined at Nairobi by Mr. and Mrs. Martin Johnson, who were to accompany them on a hunting expedition.

Girls' Flying Club Active in Races

MEMBERS of The Chicago Girls Flying Club are working on its program in connection with the International Air Races, to be held at the Curtiss-Reynolds Airport Sept. 1-4. Two of the members, Marge McCormick and Helen Colton, represented the club in a special aerobatic program in connection with the American Air Races at the Chicago Municipal Airport last month.

Ninety-Nines Hold Annual Meeting

FIFTY-ONE MEMBERS attended the fourth annual meeting of the Ninety-Nines at Santa Monica, Calif., July 3. Among members who came from distant points was Clara Livingston, who flew solo from Porto Rico.

Betty Gillies Wins Air Meet

MRS. BETTY HUYLER GILLIES was first-place winner at the annual spring air meet of the Aviation Country Club at Hicksville, L. I., N. Y., June 25. She placed first in the comedy and handicap races and third in the free-for-all. James B. Taylor won second place in the meet, and Reginald L. Brooks, third.

Club Installs Recreational Facilities

A BADMINTON COURT has been installed at Wings Field, Pa., by the Philadelphia Aviation Country Club. A swimming pool is to be another feature for use by the members.

Air Cruise Plan Proves Popular

COOPERATING in the National Air Cruise idea, a number of airports have conducted private flying trips this summer to points of interest or are planning similar projects.

A cruise for all private airplane owners in the vicinity of Washington, D. C., to New York, N. Y., in connection with the National Amateur Air Pageant is planned for October 7.

A group of planes took part in an air cruise from Glenn Curtiss Airport, North Beach, N. Y., to the national soaring contests at Elmira, N. Y., July 22-23. The first air cruise from the San Francisco Bay Airdrome, Alameda, to Santa Cruz, Calif., on June 25, was attended by pilots from those two airports and from fields at Salinas, Hollister and Watsonville.

Lieut.-Comdr. Frank Hawks has accepted the post of flight commander of the air cruise the week-end of August 19 from Roosevelt Field, Mineola, L. I., N. Y., to the Canadian Air Pageant at Montreal, Quebec, according to K. S. Lindsay, who is in charge of arrangements for the cruise. At least fifty airplanes are expected to take part in the cruise, which will take the form of an international goodwill flight. A starting committee will furnish each pilot with complete printed instructions and divide the planes into small groups of about the same cruising speed. Take-offs are to be made in such order that landings will be accomplished at Montreal within an hour of each other. A committee at Montreal will take care of parking, credentials and entertainment. Fliers from all New York metropolitan airports will be eligible to participate in the cruise.

Lady Grace Hay Drummond-Hay—famous British Aviatix, world traveler, journalist, writer, artist—entering her new four-place cabin WACO plane which she flew from Troy, Ohio, to New York, whence it was shipped intact to England on the deck of the steamship Bremen.



"The new Waco suits me personally"

... SAYS LADY GRACE HAY DRUMMOND-HAY ... NOTED BRITISH AVIATRIX



Lady Grace Hay Drummond-Hay leaving the WACO Airport for New York in her new four-place cabin WACO plane.

Recently Lady Grace Hay Drummond-Hay took off from the WACO flying field at Troy, Ohio, for New York in a WACO Cabin Plane. In New York her new ship was placed intact on the deck of the Bremen to start its journey back to England.

"I do not feel that I am 'unpatriotic' in buying a foreign aircraft, because I require a machine that has not been developed in England," says Lady Hay.

"The WACO cabin model has the great advantage of wonderful visibility to the rear, which is very necessary in Europe and especially in England where, on summer

days, our smaller aerodromes, club fields and airports are literally crowded.

"The WACO Company also offers the cabin model with air brakes that steepen the glide to the usual steep glide of British ships. We can't risk flying a machine that 'floats' as it will not get into the smaller fields without maneuvers that are frequently beyond the ability of the ordinary flyer.

"The construction and finish of the WACO leave nothing to be desired."

WORLD'S FAVORITE

WACO is a favorite not only in America but in foreign countries as well. Official

government registration figures prove that last year in America WACO outsold its nearest competitor better than 2 to 1.

In the foreign market, WACO sales for 1932 exceeded the total four-year sales of 1928, 1929, 1930 and 1931! Total domestic and foreign sales for the first 5 months of 1933 were nearly three times greater than for the same period last year!

An airplane *has* to be good to win such amazing preference. So if you're in the market for the finest ship money can buy, don't fail to see the new 1933 WACOS. Any WACO distributor will be glad to give you a demonstration of WACO performance.

HIGH SPOTS—NEW FOUR-PLACE CABIN WACO

- Classic streamline design
- Luxurious side-by-side seats
- greater visibility
- controlled ventilation
- takes-off or lands in less than 100 yards (don't try this with any other airplane)
- costs less to operate (proved)
- can be repaired at half the cost (should repairs ever be necessary)
- all facts, no fiction.

NOTE FOR DEALERS—WACO airplanes are sold by America's only independent dealer organization. There may be room for you in the family. Write for particulars. The Waco Aircraft Company, Troy, Ohio.



AT THE AIRPORTS

Ninety-nine More Airports Reported

A TOTAL of 2,136 airports and landings fields in the United States was listed on July 1, 1933, an increase of ninety-nine since July 1, 1932, according to a report prepared by the Aeronautics Branch of the Department of Commerce and made public last month. A total of 631 of the airports on record July 1 of this year were partially or fully lighted for night use.

The fields reported were classified as follows: 550 municipal and 653 commercial airports, 269 Department of Commerce intermediate landing fields, 525 auxiliary fields, 55 Army airdromes, 16 Navy air stations and 68 miscellaneous Government, private and state airports and landing fields.

California led all other states in the number of airports and landing fields, with a total of 214, while Texas was second with 136. Pennsylvania, with 111, occupied third place. California, in addition to having the largest total, also had the largest number of municipal airports, 53. Pennsylvania led in the number of commercial airports, with 70, and Alaska had the largest number of auxiliary fields, 70.

Washington Airport Is Sold

AN UNIDENTIFIED purchaser bought Washington Airport, South Washington, Va., for \$432,000 at a public auction July 17. The successful bidder, Edward Burling, acted for a client whose identity he refused to reveal. The adjacent Hoover Field, which comprises about half of Washington-Hoover Airport, was to be sold at auction July 31.

The section sold July 17 includes eighty acres on which are located the passenger terminal and administration building, the airport swimming pool and restaurant, two large hangars and the Government Weather Bureau and airways control stations.

Change in Management at Malone Field

CLARENCE E. DUFORT of the Dufort Flying Service, Inc., has rented the Malone (N. Y.) airport and plans further development of the field's surface, according to a recent announcement. The field, which has been redesignated as a temporary port of entry, is located three-quarters of a mile southwest of the center of Malone. Mr. Dufort recently completed the installation of three floodlights and the erection of a U. S. Customs office and radio and rest room. Radio equipment at the field consists of three receivers, for short waves, broadcast and long waves.

Martinsburg, W. Va., to Have Airport

PLANS have been completed for the purchase of Shepherd Field, to be held

and operated for the City of Martinsburg, W. Va., and Berkeley County as a municipal airport until they are in a position to take over the operations. The Martinsburg Chamber of Commerce has developed the plan with the Berkeley Aviation Club, which will act as the holding and operating company.

Baltimore to Improve Airport

THE MUNICIPAL authorities of Baltimore, Md., plan to spend \$1,300,000 of its more than \$16,000,000 public works program on improvement of the municipal airport, it is reported. The work at the airport would embrace grading, draining and filling. The work on the airport will begin, according to plans, as soon as the Government contributes one-third of the amount under its plan of grants. The Federal aid of thirty per cent would amount to \$390,000, while the city's share, to be secured through sale of stock in authorized loans, would be \$910,000.

Ohio Airport Survey Conducted

A SURVEY of airport projects over the state is being made by Capt. Fred L. Smith, Ohio Director of Aeronautics, to determine what improvements may be made in the state as work projects to be included in the Federal public works program. In addition, Captain Smith is endeavoring to obtain airport sites that might be developed as parts of the forestry, soil erosion and water conservation programs.

Dedication of Texas Field

THE MUNICIPAL airport of Longview, Tex., was dedicated June 23. Originally built by L. H. Pitkin, oil operator, for his own use, the airport has been donated to the city. The field is under the supervision of Bill Taylor, city manager.

Minneapolis Air Meet

THE JUNIOR Chamber of Commerce of Minneapolis, Minn., was sponsor of an air show at the Wold-Chamberlain municipal airport, June 24-25. Participating pilots including John Livingston, Art Davis, Harold Neumann, Lon Yancey, Bennett Griffin and three Naval Reserve fliers.

Flying Company Changes Base

FLIGHT OPERATIONS of the F. and S. Aircraft Corp. have been transferred to the Rising Sun Airport, Philadelphia, Pa. Bob Jefferson is chief instructor for the corporation.

Florida Seaplane Base Reopened

THE CURTISS-WRIGHT seaplane base at Miami, Fla., has been again placed in operation. It has been redesignated as an airport of entry for aircraft from foreign countries.

Improvements at Missouri Field

THE CITY of Springfield, Mo., voted a \$10,000 appropriation for improvements to the municipal airport July 11, the work to be done by the Associated Charities under contract with the Park Board. At the same meeting a committee composed of J. H. Karchmer, Byron Crutcher and L. C. Hubbell was appointed to negotiate for the leasing or purchase of twelve acres of land to be added to the airport. The city attorney was authorized to institute condemnation proceedings if the negotiations should not be successful.

The landing field is to be made ready for night flying within a few months. The entire field is to be graded and new runways are to be completed. Improvements valued at \$3,000 had already been completed early last month.

Terre Haute Field Dedicated

THE DEDICATION of the Terre Haute (Ind.) airport in honor of the late Paul Cox took place June 21. Thirty-eight airplanes of the Fifth Annual Indiana Air Tour were among participants in the dedication ceremonies, which were held under the auspices of the Aero Club of Terre Haute.

Kansas Airport's Location Changed

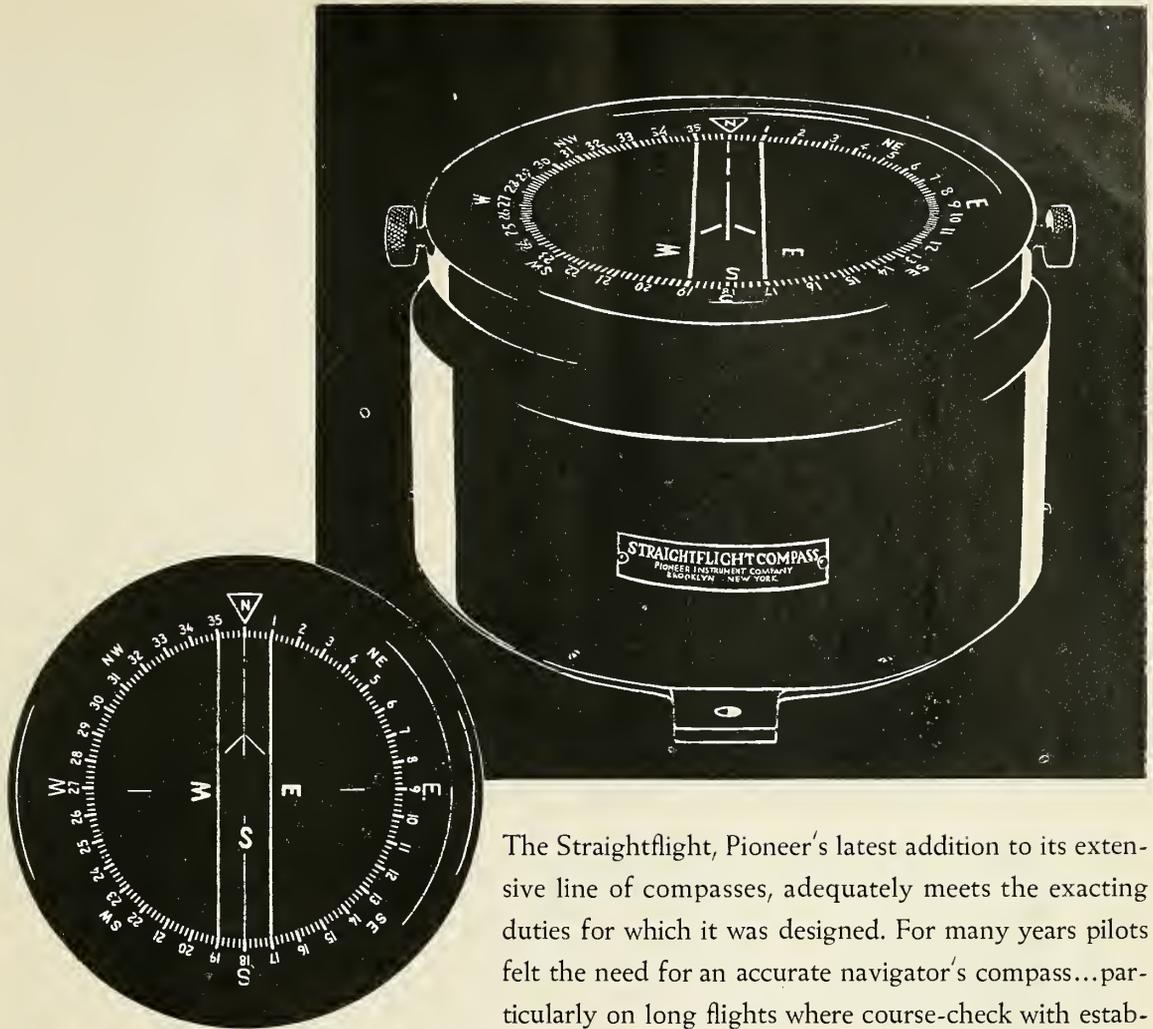
THE COFFEYVILLE (Kans.) Municipal Airport, which for the past five years has been located 2½ miles southeast of the city, was moved to a permanent location 2½ miles northwest of Coffeyville on July 1. The new field is considerably larger than the old and consists of 172 acres. Work is progressing on an 80 by 80 stone hangar and an administration building of the same material. Two crushed rock runways also are being completed. Complete lighting equipment is to be installed. A unique feature of the new airport is that it adjoins a public park on the south, where visiting aviators may swim or play tennis.

United Air Lines is reported to plan to refuel its mail and passenger planes at this field on the present daylight Kansas City-Tulsa route.

Syracuse Field Groups Enter Agreement

OWNERS of aircraft housed on the Ward field at Syracuse, N. Y., may use the city airport at Amboy by paying the same rate for a field permit as owners of aircraft housed at the municipal airport. This was determined by passage of an ordinance by the common council on July 10, which stated that the owners of the Ward property, on which the former Empire hangar is located, and the commissioner of parks are to enter an agreement of reciprocal rights for mutual use of the city airport and the Ward field.

(Continued on following page)



The Straightflight, Pioneer's latest addition to its extensive line of compasses, adequately meets the exacting duties for which it was designed. For many years pilots felt the need for an accurate navigator's compass...particularly on long flights where course-check with established land marks was not possible. And now, with the current system of "flying solely by instruments," the Straightflight attains even a greater importance as a directional instrument. Combined with the usual Pioneer features, the Straightflight embodies individual qualities which effect the desired characteristics for an ideal navigation compass...steady card...long period...no overswing. These results are produced by maintaining a strong magnetic control over an extremely light and well-damped card. A spring suspension protects the card, pivot and jewel against damage by vertical vibration, and the new Pioneer anti-vibration mounting absorbs the horizontal vibrations which usually cause swirling of liquid and card oscillation. A large card, provided with parallel lines, makes it possible to take an accurate reading at a glance. The finest testimony to the Straightflight is exemplified in its approval by Army, Navy and transport pilots.

PIONEER INSTRUMENTS

PIONEER INSTRUMENT COMPANY INCORPORATED
BROOKLYN • NEW YORK • A SUBSIDIARY OF THE BENDIX AVIATION CORPORATION

(Continued from preceding page)
Commerce Station at Newark

REGULATORY and airways headquarters of the Department of Commerce for the northeastern section will be established at Newark (N. J.) Airport under a lease negotiated last month. Jurisdiction of the Department of Commerce will extend from Maine to Virginia, including New England and the Middle Atlantic states. The headquarters, which is one of four such in the United States, will occupy the unused police station located across from the airport at the junction of Port Street and Route 25.

Lieut. Richard Aldworth, manager of the airport, and his office force will be transferred from their former quarters in the municipal hangar to the police station at the airport. The municipal hangar has been leased to Transcontinental & Western Air.

Omaha Holds Third Annual Show

RACES between Johnny Livingston in a Cessna and Harold Neumann in Ben Howard's special race job, were features of the third annual Omaha Air Show, held at the Omaha (Neb.) Municipal Airport June 16-18 under the auspices of the Junior Chamber of Commerce. The show was operated and managed by the American Air Race Association. Events also included deadstick stunting by Roy Hunt, dog fights, balloon bursting by Art Davis, trimotor aerobatics, autogiro demonstrations, Army exhibition flying and delayed parachute jumps.

Varney Renews Airport Lease

THE FRANKLIN County (Wash.) commissioners have extended for five years the airport lease at Pasco from Jan. 1, 1934, to the Varney Air Lines. The company will soon complete a 2,450-foot cross runway, extend the boundary marker lights and enlarge and improve a concrete landing apron. It was announced recently.

Five-year contracts have been closed between the Port of Portland, Ore., and the Varney Air Lines and Pacific Air Transport for space located at the Swan Island airport.

Flying Service at Philadelphia Field

THE H. & H. Flying Service is now operating from the Philadelphia (Pa.) Airport. Charter trips and student instruction form the major part of flight operations, with Morrie Hirsch and Tom Holdcraft as pilots. Equipment consists of a Stinson four-place cabin job and a Franklin Trainer.

Aeronautical Firm Sells Spark Plugs

THE HURLEY-TOWNSEND Corp. has announced that the Aeronautical Radio Co. at Roosevelt Field, Mineola, L. I., N. Y., has been made sales representative for H.-T. spark plugs. The Roosevelt Field company, which specializes in the installation of radio-shielded spark plugs, radio harness, etc., will handle the complete H.-T. line.

Air Meet at Albany Airport

A SQUADRON of New York National Guard airplanes, under the command of Maj. Lawrence Brower, and Harold Bowen, exhibition flier, were among the features at a recent air show at the Albany, N. Y., airport. The air show was held under the auspices of the American Legion.

Autogiro Service Station Opened

INAUGURATION of a complete service department for autogiros has been announced by Giro Sales & Service in connection with its business at Roosevelt Field, Mineola, L. I., N. Y. The new department is under the direction of Felix Blum.

New Manager at Evansville Airport

LIEUT. GUTHRIE MAY, of Evansville, Ind., has been appointed to succeed Werner J. Genot as manager of Evansville Municipal Airport.

Michigan Legion Air Meet

MENOMINEE American Legion Post 146 was sponsor of an air meet at Menominee County Airport, Menominee, Mich., July 2. Lieut. Walter Arntzen in a Rumsky Special monoplane won the first annual Legion Air Classic race for the speed championship of the Upper Peninsula. In addition to races, events included a bomb-dropping contest and exhibition flying.

Missouri Field Operators Expand Stock

NOTICE of an increase of capital stock from \$10,000 to \$83,000 has been filed by Ozark Airways, Inc., operators of the municipal airport at Springfield, Mo. The additional capital is needed to finance an expansion program, according to George R. Prescott, president of the company. Its repair business is growing rapidly, which has necessitated the erection of a machine shop to handle the immediate business needs.

Maine Air Service Developments

CAPT. GORDON K. BERRY, formerly with Newhamco Air Service at Concord, N. H., has founded a flying service at Skowhegan, Me., using an airport established one mile northwest of the city. He is offering charter, pleasure and instruction flights, with a J-5 Travel Air biplane.

Harold G. Riley, who operates a flying service at Livermore Falls, Me., using a Kinner Bird, has moved his base from Livermore Falls Airport to a field with more space, two miles southeast of town.

Dallas Reduces Airport Fees

THE CITY COUNCIL of Dallas, Tex., has lowered the fee assessed against private planes at Love Field, Dallas municipal airport, to one-fifth of its former cost. This fee was lowered in order to encourage aviation activities and development at the field.

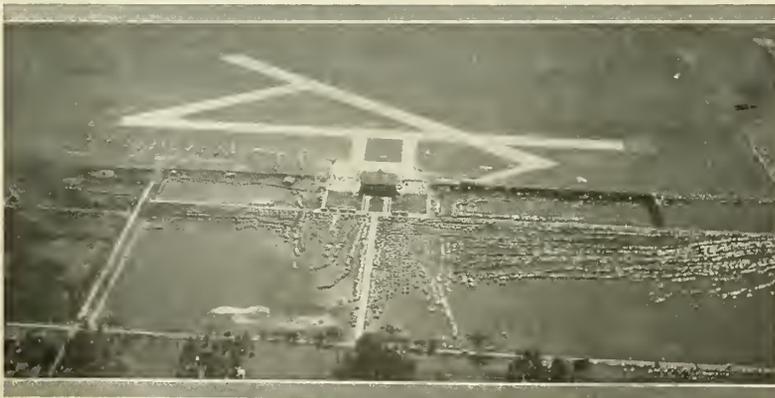
Due to the rapid increase of air traffic at the field, H. J. Schraedel has been employed as special dispatcher to supervise landings and departures of planes.

Flying Service Moves to Airdrome

PILOT GEORGE McCALLUM, who specializes in charter service and student training, now uses San Francisco Bay Airdrome, Alameda, Calif., as an aeronautical base.

Byrne Still Manager at Elgin

AN ITEM in the July AERO DIGEST stated that Arville Schroeder had been named manager of the municipal airport at Elgin, Ill. Herbert Byrne, who has been manager of the field for two years, informs us that he is still in charge of the airport and that the previous report is incorrect. Orville D. Schroeder is manager of the Valley Flying Service at the Elgin airport.



Indianapolis airport during the recent American Legion air meet

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YOUR standing as a pilot, a maintenance man, or an executive in modern aviation will depend on the quality of your basic training—what you learn about aviation *to begin with*, and the way you learn it.

Every regular Boeing student receives thorough ground training. His laboratories, shops and classrooms are the most complete in America. Back of each step in this part of his instruction is the combined research and construction knowledge of Boeing, Sikorsky, Vought and Stearman airplane companies, Hamilton Standard Propellor and Pratt & Whitney—affiliates of the Boeing School.

And in addition, he has daily observation, on the Oakland Airport, of the servicing and operation

methods of United Air Lines—in flying its multi-motored mail-and-passenger planes on Coast-to-Coast and Coastwise schedules.

In *all* of its practices the Boeing School must constantly meet the requirements of the world's greatest flying and manufacturing group. Its instruction is keyed to a standard that cannot be relaxed.

Before you sign up with *any* school, satisfy yourself which one gives the training that will best qualify you for your career in Aeronautics. The current Boeing Bulletin has complete information—courses, costs, enrollment requirements, etc. For convenience, fill in and mail the coupon below for your copy. *Next Regular Enrollment, October 2.*

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Transport Licenses) |
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NEWS OF THE SCHOOLS

Home Study Aircraft Radio Course

TO MEET a demand for men unable to attend a resident school for technical training, RCA Institutes of New York, N. Y., has compiled a short aircraft radio course for home study. The course includes a number of exclusive lessons on aircraft radio subjects taken from the Institutes' standard radio-operating course, with no change in the examination and technical consultation services which regularly apply.

Since the new rulings on air transport lines in connection with the installation of radiotelegraphy on planes and in airports, schools where radio code instruction is given have had an increased registration of pilots and ground attendants. Lieut.-Comdr. Frank Hawks is one who has completed code training at the New York school of RCA Institutes. The Chicago school of the same institution has reported increased interest in that activity.

Aeronautical School Enrolment Grows

PENN SCHOOL of Aviation at its Allegheny County and Pittsburgh-Butler Airport bases last month reported a larger enrolment during the month of June than for any month since 1930. Twenty-one new flying courses have been signed up, totaling over 800 flying hours and fifteen new ground school students have joined the school.

Boeing Gives Home Courses for Airline

A SERIES of home study courses in various aeronautical subjects has been developed by the Boeing School of Aeronautics, Oakland, Calif., for the benefit of United Air Lines employees, to whom the courses are being offered without cost. Subjects covered in the home study curriculum include organization and industrial management, communications, aircraft power plants and airplanes. Additional courses will probably be added later.

Utica School to Give Ground Course

A GROUND COURSE in aviation mechanics, including theory and practical work in study of airplanes, engines and

aerodynamics, was to be introduced in the adult education curriculum of the Part Time School at Utica, N. Y., according to a recent announcement. The class will be directed by Le Vere C. Tremblay, graduate of Dallas Flying School and licensed transport pilot and mechanic.

Student Receives Thesis Award

HERBERT HUNTING, University of Detroit aeronautical engineering senior, was recently awarded the gold medal of the Detroit Section of the S. A. E. for the best thesis prepared by a student in a Michigan college. Mr. Hunting's thesis involved the experimental investigation of stresses in a Stout semi-monocoque metal fuselage loaded as a cantilever beam.

Parks Alumni in Aeronautic Fields

TWELVE leading air transport and airplane manufacturing companies and seventy-three smaller companies now employ Parks Air College graduates, according to figures recently compiled by the college, located at East St. Louis, Ill. Other alumni are flying for business executives, and more than 265 graduates are in business for themselves, some of these employing other Parks graduates.

Boeing Class Is Graduated

TWENTY-TWO STUDENTS at Boeing School of Aeronautics, Oakland, Calif., were graduated at commencement exercises for the thirteenth graduating class recently. Five had completed the master pilot course, and seventeen, the master mechanic course.

School Adds Mechanics' Course

THE RISING SUN Aircraft School of Philadelphia, Pa., has recently added to its curriculum a complete mechanics' course. This course will be run separately from the master mechanics' course. The new course is intended primarily for those students whose time is limited and will include twenty per cent theoretical work and eighty per cent actual shop practice on modern ships and engines. It will be under the personal supervision of Lieut. Warren G. Nichols.

Naval Officer Joins Ryan Faculty

LIEUT.-COMDR. PAUL BATES, U.S.N., retired, has become affiliated with the Ryan School of Aeronautics at San Diego, Calif., where he will conduct special residence courses in advanced navigation. Commander Bates' service with Naval aviation brought him extensive experience both as a pilot and navigator. His various posts included those of executive officer at the Naval Air Station, Norfolk, Va., and executive officer of the aircraft carrier *Langley*.

Graduate to Conduct Autogiro Study

A SCIENTIFIC STUDY aimed to increase the efficiency and speed of the autogiro has been undertaken at the Daniel Guggenheim School of Aeronautics of New York University by Joseph Rosen, a graduate of the school, it was announced recently. The study will be undertaken under a fellowship established by Harold F. Pitcairn, president of the Autogiro Co. of America and will be carried on for at least one year.

The method used by Mr. Rosen will be similar to that developed by him and his brother, Eugene. Developed at the suggestion of Prof. Alexander Klemin, the method is a system of distributing the masses of a model autogiro, and of imparting a minute fractional horsepower to the rotor so that the wind-tunnel tests of rotary airfoil systems duplicate exactly full flight tests.

Students Make Cross-Country Flights

OVERNIGHT trips which students of Ryan School of Aeronautics, San Diego, Calif., have made recently in Great Lakes planes included such destinations as Las Vegas, Nev., with a special additional flight over Boulder Dam; a two-day trip to San Francisco, a flight to Death Valley and a visit to Mexico, with an overnight sojourn at Ensenada. These student flights, which are accompanied by one of the school's Government-approved instructors, are usually made in three-to-five-ship formations. Stops are made at intervening airports so that both students and instructor can discuss the route covered and the navigation problems.

Ride the Beam & Know Your Weather

Aircraft **Westport** Radios

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GROUND STATION RADIO

● Covering all aviation channels as well as all entertainment broadcasts, the Westport ground station radio receiver in a beautiful hand matched burl walnut cabinet is convenient for airports, executive offices and pilots' homes. An 8-tube superheterodyne ready to plug into an electric light outlet. Price, complete, only \$79.50.

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Offers you... Located on the Municipal Airport, Tulsa, one of the busiest in the entire country; you are given the opportunity to study every type of airplane in use today, both Commercial and Government.

Here, daily study and practice go hand in hand with actual private and airline operation—adjacent to the school is located the Spartan Factory, one of the largest and best equipped plants of its kind—home of the SPARTAN Plane known throughout the country.

Here—*theory gives way to actual flying conditions*—a SPARTAN Graduate knows WHEN to do a thing and HOW to do it, in the only CORRECT way it should be done. He has the foundation training fitting him to

take his place tomorrow among the GREATEST NAMES IN AVIATION, and today Spartan Courses are priced the lowest in the history of the school. Nowhere can you find the equipment to compare, flying facilities, or personnel, for SPARTAN is the ONLY MILLION-DOLLAR COMMERCIAL FLYING SCHOOL GOVERNMENT APPROVED IN THE WORLD! Why accept less than Spartan Training—write now, *it may mean the greatest step forward you will ever take.*

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Transport Pilot's Flight and Ground Course . . .	\$1,745.00
Limited Commercial Pilot's Flight and Ground Course	520.00
Private Pilot's Flight and Ground Course	375.00
Master Mechanic's Flight Course (Solo Pilot's License)	300.00
Master Mechanic's Ground Course (5 Months) . . .	225.00
Regular Mechanic's Flight Course (Solo Pilot's License)	225.00
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Room rent FREE with any above course during entire period of training. Part time work if desired.

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Dallas Aviation School

C. E. HARMAN, Gen. Mgr.

● Maj. W. F. (Bill) Long, one of the well known pilots of the country, is president of one of the largest and best known Government-approved aviation schools in the United States—the Dallas Aviation School & Air College, Love Field, Dallas, Tex. Major Long was one of the first licensed pilots, was an overseas pilot, observer and photographer during the World War, and has been actively engaged in aviation ever since.

All flying and ground training is given at Love Field which has every modern facility for commercial aviation. It is a tiled and drained field with hard-surfaced runways, lighted for night flying, with boundary lights, runway lights and a revolving beacon that operates all night. Lights are operated from a control tower with an operator continually on the job.

The school itself owns and occupies four hangars and also has a completely stocked parts and supply building, classroom building, instrument laboratory, a Government-licensed airplane repair depot, machine shop and gasoline storage building. Three dormitories and a cafe are owned by the school, and all officials and employees live on the premises. This results in a close relationship between the student body and the management, increasing the feeling of good fellowship.

The school's flight equipment includes

many different types of aircraft. The principal type of training ship is the Fleet, of which five are used, powered with Warner or Kinner engines. The other planes are: Wasp-powered seven-place cabin Travel Air, equipped with landing lights, flares, starter and radio; Ford trimotor; Continental-powered four-place cabin Waco, equipped with landing lights, flares, electric starter and radio; four-place cabin Stinson; three-place Wright-powered Stearman biplane, equipped with special instruments and hood for blind flying and radio reception, and a Challenger-powered Rearwin Ken Royce, equipped with radio. With these airplanes students may prepare for ratings on ships under 3500 pounds, from 3500 to 7000 pounds, and 7000 pounds and over.

Variety of Ships Used

The school also owns a Pitcairn biplane, used for making weather observation flights each morning, under contract with the Department of Agriculture. The school is an authorized Stinson agency, as well as field distributor for Texaco gasoline and oils.

Flying instruction is conducted on the basis that flight is made for a specific purpose, and the student is always under



Radio tower and beacon at Love Field, Dallas



Maj. W. F. (Bill) Long, president

the guidance of an expert flight instructor. Training includes instrument and radio beam blind flying in the Stearman; night flying in the Travel Air, Waco and Fleets; radio beam flight problems, day and night; altitude flying; compass flights; flying by map only; group cross-country flights; and co-pilot experience on the Ford, while the ship is actually at work carrying passengers.

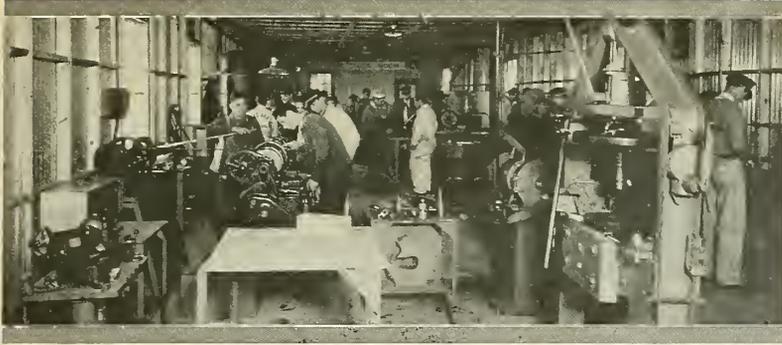
Theoretical training in engines and airplane mechanics, navigation, meteorology, parachutes, instruments, rules and regulations, etc., is given in well lighted, comfortable classrooms. Explanations are made by interesting chalk talks, demonstrations, and examination of cut-away engines, carbureters, fuel pumps, gas tanks, instruments and other parts of the airplane and engine. Students may ask questions at any time, and each subject not clear in the mind of the student is dealt with until it is understood.

Emphasis is placed on the necessity of the student's utilizing his classroom



Stearman, radio- and blind flying-equipped

Aerial view of Love Field, showing a portion of the Dallas School buildings



Partial view of the machine shop showing some of the modern machinery

knowledge in the shop, so he may combine the exactness of classroom study with the practical side of his training. Thus the student is induced to coordinate the use of his head and hands. The classroom study of meteorology and navigation is supplemented with actual problems encountered by the student in the air, and prior to cross-country flights the participating students are required to plot their course on a map.

Familiarization with the laws, rules and regulations of the Department of Commerce is strongly emphasized. In this connection the instructors in the shop departments question the student as to whether contemplated repairs will be approved by the Department inspector when completed. This training eventually results in the application of classroom knowledge to the job at hand before a tool has been applied.

Instruments, Propellers Studied

The study of aeronautical instruments is covered in the classroom, but a recently completed laboratory provides the necessary actual working experience. Here the student, working with an instrument specialist, disassembles, repairs and rebuilds various types of instruments, as well as the electrical units connected with the operation of aircraft.

The subject of propellers is covered in the classroom and dealt with in a practical manner in a department equipped

for the repair and service of wood and steel propellers. This equipment includes a sixty-ton arbor press, etching tanks and the facilities necessary for tracking, balancing and pitch setting.

Another feature of the school is the parts and supply department, where a large stock of airplane and engine parts and personal flying equipment is maintained. The student is schooled in the operation of such a department, and is familiarized with the necessary records and sales procedure.

Thorough Radio Course

Radio, of increasing importance to aviation, is covered in a new radio department and radio station, W5YK, which is equipped with radio telegraph and radio telephone transmitters. All school (and considerable outside) radio construction, installation and repair are handled by the students in this division. Facilities are more than adequate to fit the student to acquire radio licenses up to and including second-grade commercial license.

Equipment in the Government-licensed airplane repair depot includes wood- and metal-working machinery, lathes, drills, fabric-sewing machinery, baking and enamelling equipment, paint-removing vats, electric hand tools and other miscellaneous facilities. Practical instruction in this department includes the extent of repairs allowed by the Department of Commerce; proper method of using

tools; inspection and repair of controls and cables; construction and repair of wood and metal wing and fuselage structure; splices; covering and doping; refinishing of an airplane; assembly of the airplane; rigging; soldering; construction of cables; repair of tail skids and undercarriages; bearings; line inspection; periodic inspection; and other interesting and necessary duties.

In the welding school the student first practices welding on various kinds of metals, and when he has gained the necessary ability constructs and practices repairs on engine mounts, fuselages, undercarriages and other welded parts of the airplane.

Disassembly Important Part of Study

The disassembling, repair and rebuilding of air-cooled radial-type engines form an important cog in the school curriculum. The student is familiarized with each part of the engine, its place, purpose and repair. He then disassembles an engine, cleans all parts and makes the necessary repairs, rebuilds the engine and tests it. This experience covers the majority of modern air-cooled power plants. Sand blasting and refinishing, clearances, detection of weak parts, grinding and reseating of valves, fitting of piston rings and wrist pins, inspection of bearings, magnetos, carburetors and other component parts of the engine also are covered.

Students live at the school dormitories and take their meals at the cafe at the field, which is less expensive than living in town. The school is located just six miles from the heart of the city and there is excellent bus transportation to and from the city every twenty minutes, eighteen hours a day.

U. S. and Foreign Students Enrolled

Students have been enrolled from every state in the Union and from many foreign countries, and enrolment continues to increase, just as the training facilities of the school are constantly being enlarged in accordance with the carefully prepared plans of the faculty.



Waco cabin model, radio- and night-flying equipped

Instructors and students at work in one corner of the motor shop



THE AIR SERVICES

Precedence in Air School Appointments

PRIORITY in appointments to the Army Air Corps primary school at Randolph Field, Tex., has been announced in the following order under a change of policy by the War Department:

Graduates of West Point, graduates of Annapolis, graduates of the United States Coast Guard Academy at New London, enlisted men of the Army Air Corps and other branches of the Army with at least six months' service, officers and enlisted men of the National Guard with at least six months' service with Air Corps units, college graduates who are graduates of Air Corps R. O. T. C. units and similar units of other arms or services, graduates of recognized universities and colleges, officers and enlisted men of the National Guard with at least six months' service, college students who are members of Air Corps R. O. T. C. units and who have completed their junior year, Reserve officers and enlisted men with at least six months' service, students who have finished two years at a recognized university.

Midshipmen and Coast Guards who are now made eligible for admission to Randolph Field must be recommended for appointment by the superintendents of their academies and must apply for the appointment within a year after their graduation.

Advanced Aerology Class to Open

THE FIRST advanced course in aerology for selected chiefs and first-class is scheduled to start at Lakehurst, N. J., next month. The course is designed to be of assistance in using methods in accordance with the latest developments in aerology, particularly in the analysis of weather maps and preparation of forecasts in conjunction with the polar front methods.

Kelly Field Class Graduated

NINETY-ONE STUDENTS who had undergone the year's intensive course of flying training were graduated June 29 from the Army Air Corps flying school at Kelly Field, San Antonio, Tex.

New Fighters for Navy "High Hats"

T. P. WRIGHT, vice president and general manager of Curtiss Aeroplane and Motor Co. of Buffalo, N. Y., has announced the sale of twenty-eight of the latest model Hawk single-seat Navy fighting biplanes, amounting to approximately \$500,000. These planes, known as the Curtiss F11C-2, will operate at the Naval Operation Base at North Island, San Diego, Calif. They will constitute the new flying equipment for the High Hat Squadron.

The Curtiss F11C-2 is powered by a nine-cylinder 700-horsepower Wright

Cyclone engine, which weighs only 1.22 lbs. per horsepower. It is equipped with the Curtiss single-strut landing gear. The pants on the F11C-2 are cut away so that the wheel can be serviced without first removing the fairing.

Group Elects Air Leaders as Members

THE WASHINGTON (D. C.) Air Derby Association has elected to its membership Rear Admiral Ernest J. King, head of the Naval Bureau of Aeronautics, and Maj. Roy Geiger, commandant of Marine Corps aviation.

Navy Takes Up Gliding

PRACTICE in gliding has been undertaken at the Pensacola (Fla.) Naval Air Station in an effort to study the use of gliding as an adjunct to flight training. Lieut.-Comdr. R. S. Barnaby, a pioneer American soarer, has been sent to the station to teach flight instructors how to soar and to instruct in methods of teaching flying by the use of gliders.

Changes Planned at Tactical School

IMPROVEMENTS amounting to approximately \$400,000 are to be made at the Army Air Corps Tactical School at Montgomery, Ala., according to a recent report. These will include a warehouse, officers' quarters, officers' mess hall, completion of barracks, bomb storage cellar, improvement of landing field, placing high-tension electric lines underground and road improvements to be made on the reservation.

Albrook Field Reconnaissance School

THE 44TH Observation Squadron, Albrook Field, Panama Canal Zone, has been conducting a reconnaissance school for officers of other branches of the service. The course consists mainly of aerial reconnaissance and observation and is of one month's duration.

Naval Officer Officially Commended

A LETTER of commendation has been sent by Secretary Swanson of the Navy to Lieut.-Comdr. Joel J. White for his development of an instrument for the analysis of air in the cockpits and cabins of airplanes to determine the carbon monoxide concentration. Lieutenant-Commander White, who has been on duty in the Navy Department and also as an instructor at the Naval Medical School, has been ordered to duty on the staff of Commander Aircraft, Base Force.

Oakland Naval Reserve Base Improved

THE NEW DISPENSARY at the Oakland, Calif., Naval Reserve base has been placed in commission, leaving unobstructed the 24,000 square feet of hangar space.

Naval Changes in Pacific Area

SEVERAL TRANSFERS of important Naval commands have been reported recently in California and vicinity. Rear Admiral John Halligan has succeeded Rear Admiral Harry E. Yarnell in the command of Aircraft, Battle Force. Admiral Yarnell has become the commandant of the Fourteenth Naval District, while Admiral Halligan has been succeeded at San Diego as Commander Base Force, Aircraft units, by Rear Admiral Alfred W. Johnson.

Aboard the aircraft carrier *U. S. S. Langley* Capt. P. N. L. Bellinger has been detached and command has been assumed by Capt. Kenneth Whiting. Lieut. William N. Updegraff, who has been succeeded at the Pensacola (Fla.) Naval Air Station by Commandant McCrary, has taken command of VS Squadron 1B aboard the *Langley*.

Lieut.-Comdr. A. P. Schneider has assumed his command at the Naval Reserve Aviation Base, Long Beach, Calif., and Lieut.-Comdr. George D. Price has taken over the command of the Seattle (Wash.) Naval Reserve Aviation Base.

Plane Helps Rescue Six from Drowning

SIGHTING smoke from a burning yacht eight miles away, two New York National Guard fliers flew to the scene of the fire, threw a life preserver to a party of six who had been forced overboard in Block Island Sound and radioed for assistance, which resulted in the rescue of the yacht owner and guests on July 12.

The two fliers, Lieut. C. L. Youmann, pilot, and Capt. William G. Rector, observer, members of the 27th Division, Aviation, N. Y. N. G., had been directing artillery fire for the 245th Coast Artillery of the New York National Guard when the burning yacht, belonging to Col. M. R. Guggenheim, of Babylon, L. I., N. Y., was seen. Diving to within twenty feet of the water, they dropped the life preserver and called headquarters at Fishers Island for help. A Quartermaster Department tugboat with which headquarters communicated reached the shipwrecked group and took them to safety.

Army Flier Is Honored

CAPT. DONALD L. BRUNER of the Army Air Corps has been awarded the Distinguished Flying Cross. Captain Bruner took an active part in developing night-flying equipment at McCook Field, Ohio. He is credited with inventing the first revolving beacon and the first air-plane-carried electric landing lights and with being responsible for the development of devices from these inventions. He also was responsible for the establishment in 1922 of the first night-operated Army airway between Dayton and Columbus, Ohio.



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Interpretation of Data of Model Basin Tests on Aircraft Floats

COMMANDER HOLDEN C. RICHARDSON, U.S.N. (Ret.)

● So far as the determination of the merits of different designs from the point of resistance and power required is concerned, Δ/R curves have been accepted as being the best criterion.

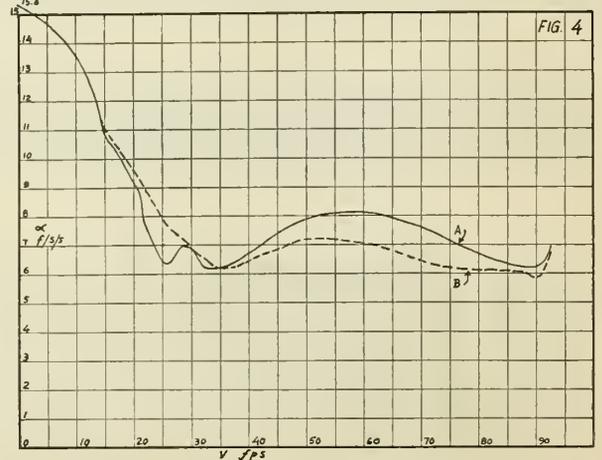
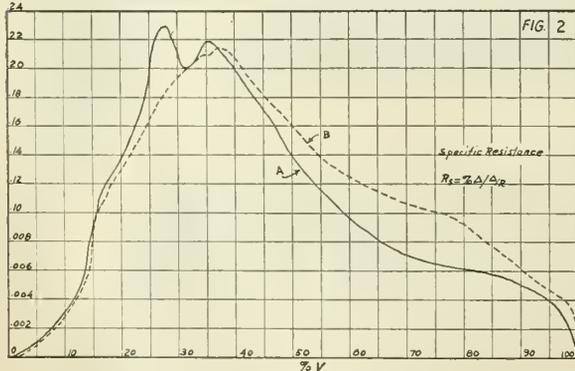
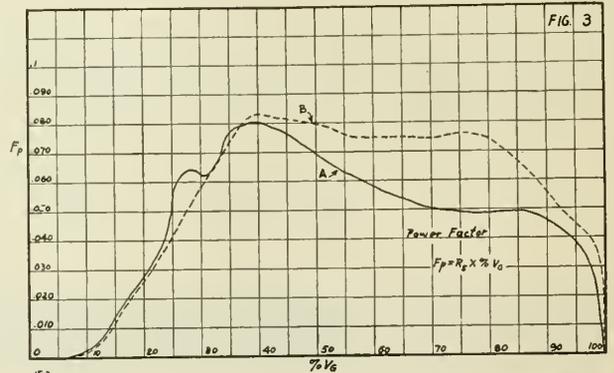
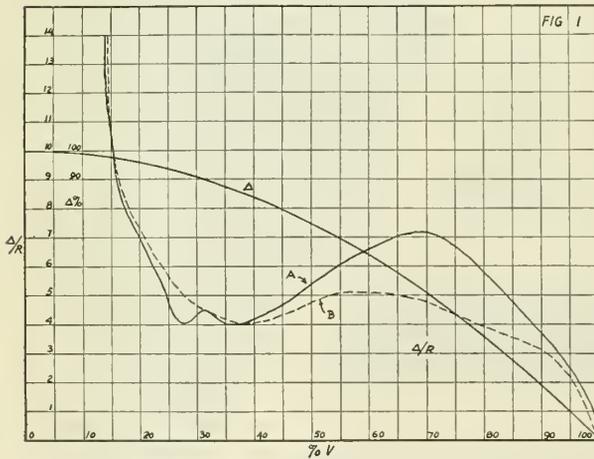
The Δ/R curves are non-dimensional plots derived from the speed resistance data of a particular model. By the ingenious method adopted for this plot, the base scale is percentage of the get-away

speed. Δ is plotted as a percentage of the gross weight, less the wing lift, and the ratio Δ/R is also plotted to the $\%V$ base. (Figure 1.)

Being non-dimensional, and accepting the law of comparison to apply if geometrical similarity of the submerged lines of the model and the full-sized construction are retained, it is logical to compare such plots in choosing float lines.

However, I have recently tried some modifications of this plot which I believe give a clearer conception of conditions. These modifications are what I call the "specific resistance" plot and the "power factor" plot, derived in order from the Δ/R plot.

For purposes of illustration, I have used the actual data for two different models in the three plots of figures 1, 2, 3.



The latter two plots are derived as follows:

From Figure 1, we tabulate opposite %V, %A, and Δ/R ; and dividing the second column figures by the third column figures, we derive and tabulate R_s , the "specific resistance" (Figure 2).

The next step is to multiply this new set of figures by the %V and tabulate F_p , the "power factor" (Figure 3).

Now it should be obvious that to get the resistance of any particular full-size design, it is only necessary to multiply R_s by the weight, i. e., a constant which will be the same for either model, and that, therefore, the R_s plot is in fact a picture of the comparative resistances.

In like manner, to get the power required, it is only necessary to multiply F_p by the get-away speed, and divide by 375, to get the horsepower required. Again a constant ($V_g/375$), so that this plot gives a picture of the comparative horsepowers required.

In all three plots, the full lines refer to the data of model "A," and the dash lines to model "B."

Up to this time, the "hump speed" has been considered an important factor, and it is, for at this point the reserve thrust generally is least. But the R_s plot indicates this more clearly. Thus on the Δ/R plot, the minimum Δ/R indicates two humps for model "A" at 28% and 36% respectively, and substantially equal numerically to that of the hump of the "B" model at 39% V_g . On the R_s plot these humps occur at substantially the same points as before, but are now of definitely different magnitudes, and if the hump criterion were the whole story, there would be little question that model "B" is superior.

Returning to the Δ/R plot, however, we see that beyond hump speed model "A" is considerably superior to model "B," for the larger Δ/R in the vicinity of 70% V_g indicates a much lower resistance. Examination of the R_s and the F_p plots confirms this. Also the F_p plot shows that at hump speeds the spots have taken quite a different order to those of the other plots.

The differences in the indications of the R_s and F_p plots are more apparent than real. This is for the reason that the resistance must be compared with the net thrust available, which in the region of the hump will usually be found to closely parallel that of a tangent line to the "A" and "B" humps; and, on the other hand, it will usually be found that the E.H.P. available curve will closely parallel a tangent arc to the humps of "A" and "B" on the F_p plot. It is therefore necessary, in order to correctly interpret the information of the plots, to take account of plane drag and propeller thrust, and therefrom to determine the propulsive force available.

Unfortunately, it is not possible to re-

duce plane drag and propeller thrust to non-dimensional plots for the general case. However, in order to show their importance and their influence in the interpretation of the model basin data, a particular case has been examined.

Figures 4 and 5 are, for example, based on an actual design of airplane in which the weight is 4,800 pounds. From the "specific resistance" plot, the float resistance is determined for a "getaway" speed of 63 miles per hour, also at this speed the air resistance of the plane is 660 pounds. Assuming this resistance to vary with V^2 the air resistance is readily determined. It is also known that the "standing" thrust of the propeller is 2,300 pounds and varies substantially, linearly reducing to 1,700 pounds at getaway.

Now, by plotting these values from start to getaway, we can readily determine the reserve thrust at any speed, which is equal to the propeller thrust, less the sum of the plane resistance and the float resistance.

The reserve thrust is the accelerating force, and since $f = m a$ wherein f is the reserve thrust and m is $\frac{w}{g}$; a is readily determinable in $f/s/s$.

From the plot we may then tabulate a for each float, corresponding to selected velocities, and convert the latter from m.p.h. to f/s , and re-plot as per figure 4.

We now have the necessary information to determine velocity to a time base, and therefrom the time and distance required to take off in a calm.

By integration of the a curves we de-

rive the velocity curves of figure 5, which show that the "A" float permits getaway in 11.6" versus 12.3" for the "B" float.

Integrating the velocity curves, we find the "A" float requires a distance of 590 feet to get away, and the "B" float 650 feet.

Replotting the a and v curves from figure 4 to figure 5, we find an interesting difference between the velocity and time plots.

While the differences are surprisingly small in time and distance, there is little question that the "B" float should prove superior. However, in both these cases, the reserve thrust is unusually high, and had it been lower, the differences of time and distance to "take off" would have been much more apparent.

The curves of figure 5 afford a more nearly exact and definite criterion as to the merits of the two floats in a particular case, than the Δ/R plot.

The differences in the examples chosen are small, but well illustrate by the crossings of both the v and a curves, the influence of the differences in the Δ/R plots and their relative importance.

They also illustrate the importance of the pilot's technique, for beyond the "hump speed" the Δ/R curves are very sensitive to change of trim, and might readily nullify the conclusions arrived at from the plots. But, assuming skilled pilots, and the same general technique, float "A" should excel float "B."

From a practical standpoint, it is obvious that a seaplane pilot should know his float characteristics if he is attain the best results.

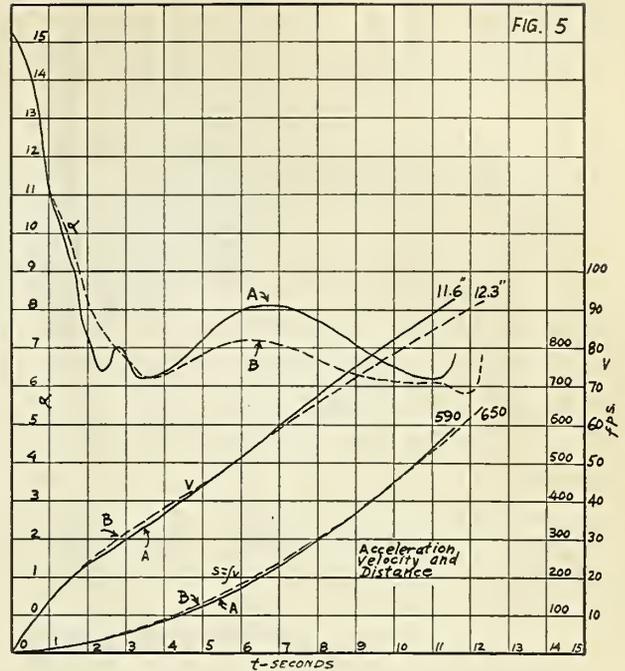


FIG. 5

Digest of Technical Articles from Foreign Publications

ELSA GARDNER

Exhaust Valve Failures

Exhaust Valve Failures, C. C. Hodgson. Automobile Engineer, Vol. 23, No. 307, June, 1933, pp. 223-227, 22 figs.

THE failure of exhaust valves which have been used under service conditions on bench tests or on the road is discussed. Breakages were considered to be the result of corrosion fatigue, while burning and cracking of the valves at their edges appeared to be caused initially by small leakages of hot gases. To meet the requirements of an ideal valve, combining resistance of the seat to burning, high strength and scale resistance in the neck, and the best wearing conditions for the stem and tip, the author believes that a three-piece construction and selective surface hardening are necessary.

Paper presented before the British Iron and Steel Institute.

Propeller Flutter

The Present Position of the Investigation of AircREW Flutter, W. J. Duncan. (British) Aeronautical Research Committee—Reports and Memoranda No. 1518, December, 1932 (published June 30, 1933), 44 pp., 13 figs.

A GENERAL REVIEW of past work on propeller flutter is given in Part I of the report, together with a brief and non-mathematical account of the investigations described in the other two parts.

Part II is devoted to a mathematical discussion of the stability of a solid cylindrical blade in an airstream, and it is shown that there is a great simplification of the theory for massive blades of large aspect ratio. It was found that the fac-

tors which principally controlled the critical speed were the torsional stiffness of the blade, the position of the centroid in the chord, and the air density.

Part III furnishes an account of some experiments on model propellers with very flexible blades, and a simple arrangement for the visual observation of the flutter of rotating blades is described. The experiments provide a clear demonstration of the occurrence of unstable coupled oscillations of propeller blades and show that the critical flutter speed rises greatly as the center of gravity is moved toward the leading edge.

Anti-Knock Fuel Rating

Anti-Knock Qualities in Fuels, A. W. Morely. Aircraft Engineering, Vol. 5, No. 52, June, 1933, pp. 132-133.

TESTS required for rating fuels for aircraft engines according to their anti-detonation properties are discussed. The author points out that the mixture strength giving maximum detonation will not necessarily be the same for both air-cooled and water-cooled engines, and suggests as a working rule in the case of the air-cooled engine a wind speed regulated over the range of anti-knock rating to maintain the cylinder at a temperature which equals the maximum allowed under working conditions. He also recommends a special investigation for supercharged engines. He concludes that it is not likely that the importance of fuel rating on cylinders of aircraft-engine proportions will justify the expense of iso-octane and normal-heptane fuels for routine tests, as

lead-ethyl has proved to be a most useful substance for anti-knocking rating.

This article is an introduction to one by D. R. Pye on "The Knock Rating of Aviation Fuels," which summarizes the recent researches undertaken at the investigation of the Institution of Petroleum Technologists and is to be read before the World Petroleum Congress. Mr. Pye's article will no doubt appear in a subsequent issue.

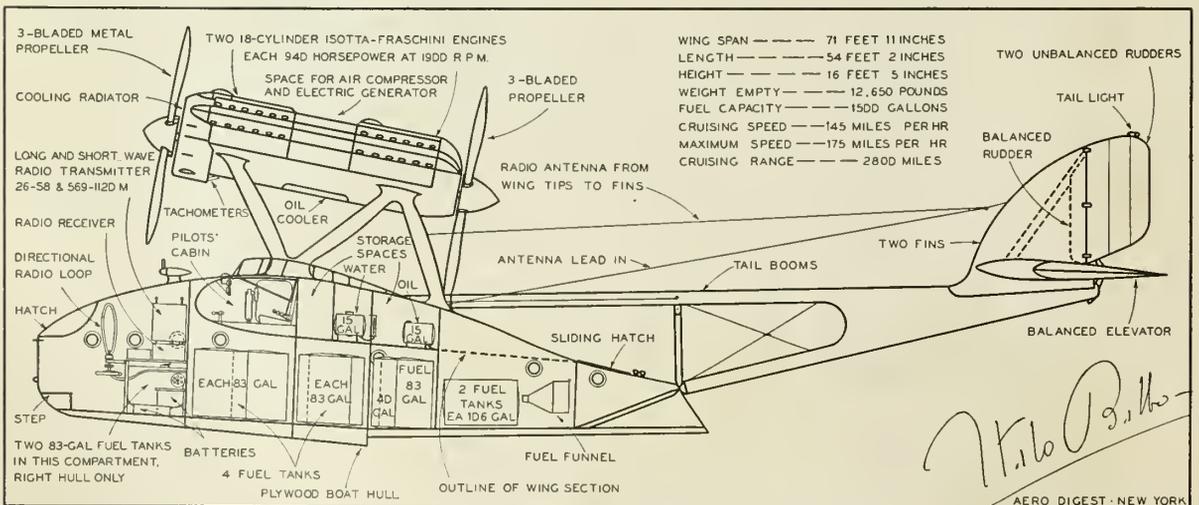
Diesel Engines

Aviation Engines Run by Alcohol. Diesel and Gasoline Engines in Use in Aviation (Motori d'aviazione ad alcool. Motori Diesel e motore a scoppio nell'uso d'aviazione), G. A. I. Raffaelli. Rivista Aeronautica, Vol. 9, No. 4, April, 1933, pp. 1-6, 1 fig.

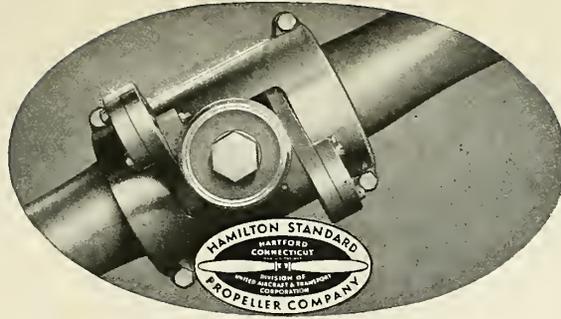
A RATIONAL SOLUTION of the problem of an aviation engine operating on alcohol is discussed in the first article, and the author concludes that it should be of the Diesel type. He believes that the Diesel engine running on alcohol will be lighter than when operated with oil. He points out that in using alcohol acidity takes place during combustion, which requires a proper selection of material for exhaust valves, and that alcohol dissolves castor oil, damaging its lubricating qualities.

In the second article, the author compares the weight and fuel consumption of gasoline engines and Diesel engines operated by oil. For planes with less than 10-hour range, he concludes that the Diesel possesses an excess weight, and, compared with the load of fuel carried, the range is reduced. For planes with a range of less than 20 hours, the fuel consumption per kilometer flown is less with the Diesel. For ranges exceeding 20 hours there exists a real advantage in the use of the Diesel, and this advantage always increases in proportion to the range.

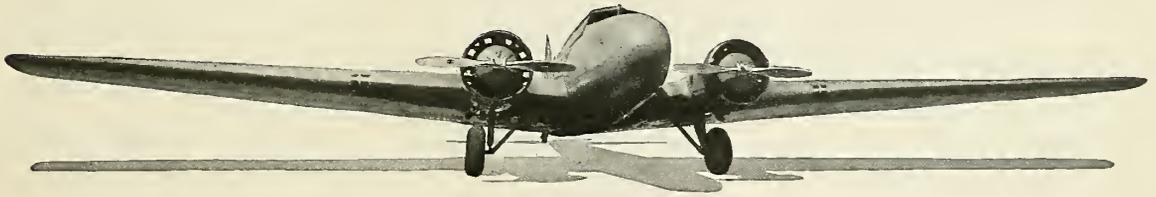
(Continued on following page)



Sectional diagram showing the general arrangement of the long distance Italian Savoia-Marchetti seaplanes



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(Continued from preceding page)

Metal Films

A New Method of Thickness-Measurement of Metal Films, S. Tanaka. Tokio Imperial University, Aeronautical Research Institute—Report No. 91, Vol. 7, No. 10, January, 1933, pp. 291-306, 8 figs.

EXPERIMENTAL RESEARCH to find a way of determining the thickness of metal films deposited on plane glass surfaces is described. The new method shown may be used for thicknesses less than 0.01 micron and is applicable even when the metal surface is somewhat granular. The thickness measured is the distance from the mean plane of the reflecting glass surface to the mean plane of the reflecting metal surface. With the apparatus described, determination of five angstrom units of metal film thickness (the order of magnitude of molecular spacings of metal crystals) means the determination of position of the lines of a regular straight-line lattice on a photograph to 0.001 mm. For this determination a method even better than measurement by a comparator is explained.

Biplane Struts

The Position of Struts on Biplane Cellules (Posizione dei montanti nelle cellule biplane), R. Verduzio. *L'Aerotechnica*, Vol. 13, No. 5, May, 1933, pp. 507-524, 7 figs.

APPROXIMATE FORMULAS are developed for determining the most convenient location for struts in designing spars and wings as thin as possible. For the biplane three-strut wing cellule, the span being equal to one, the length of the two outer and two inner bays for the continuous spar is 0.145, 0.355, 0.145, and for the spar with a center hinge, 0.1465, 0.3535, 0.3535, 0.1465; this holds good for both the upper and lower spar, as well as for both front and rear spar. The case of the four-strut spar is a little more complicated, while in the case of five struts, the determination depends on the intensity of the axial compression of the spar, which compression varies from one bay to another, and the problem becomes more complex.

Slotted Wings

Variable Camber and Slotted Wings (Ailes à courbure et fentes variables), J. Lacaine. *L'Aéronautique*, Vol. 15, No. 168, May, 1933, (*L'Aerotechnique supplément*), pp. 40-44, 7 figs.

THE EFFECT of slots on the simultaneous variation of camber and surface of airplane wings is discussed by the collaborator of Mr. Toussaint in the Aerodynamic Laboratory of Saint Cyr. The mechanical aspects are not considered, but the solutions studied are classified in two groups, one comparing the rotations or translations creating the slot and, simultaneously, the increased camber and surface, while the other utilizes the rotations of the parts, each compared with the other, these rotations operating

two slots into the inside of the profile and allowing the regulation of the thickness. Tests made in the wind tunnel of the two models are considered and the experimental results compared with those calculated from the theory for wings with multiple ailerons. Reference is made to a particular form of lower slot which resembles a type of split flap.

Turbulence Effects on Airship Models

The Effect of Turbulence on the Drag of Airship Models, Hilda M. Lyon. (British) Aeronautical Research Committee—Reports and Memoranda No. 1511, August 9, 1932 (published June 28, 1933), 28 pp., 27 figs.

THE OBJECT of the experiments described was to examine the effect of varying degrees of initial turbulence in the wind tunnel on the relative drag coefficients of two airship models, having the same fineness ratio of 5 to 1, but different block coefficients of 0.58 and 0.7. In the bare tunnel, the drag coefficient of the model with the higher block coefficient was found to be about 50 per cent higher than that of the other model at a Reynolds number of 1,600,000. With increasing turbulence the drag coefficients for the two models increased and approached one another until they finally became equal for the highest degrees of turbulence obtained. It is concluded that, for the full-scale airship, where the boundary layer of either shape is probably almost wholly turbulent, there is nothing to choose between the two shapes from the consideration of resistance alone.

Variable-Pitch Propellers

Some Possible Advantages of a Variable-Pitch Airscrew, W. G. Jennings. (British) Aeronautical Research Committee—Reports and Memoranda No. 1516, October 10, 1932 (published June 28, 1933), 25 pp., 11 figs.

IT WAS FOUND in the described investigation that when used with a normal airplane and a normally aspirated engine, the variable-pitch propeller did not improve the climb or speed appreciably. With a supercharged engine, however, it gave a marked increase in rate of climb below the supercharge height. The advantage of a variable-pitch propeller increased with increased speed range and was thought to be greater for an airplane designed for a specific purpose. A large increase in static thrust was possible in the case of geared engines where high-pitch propellers were normally required, while for ungeared engines with a low-pitch propeller there was no appreciable gain in static thrust. For normal propellers, the maximum range was not greatly improved by varying the pitch, but for low-pitch propellers the increase in range was more marked. It was also found that the variable-pitch propeller might be used as an effective "air brake" to increase the gliding angle.

Intubed Propeller

Calculation of a Helicoidal Ventilator Placed Inside a Tube (Sul calcolo del ventilatore elicoidale intubato), C. Ferrari. *L'Aerotechnica*, Vol. 13, No. 5, May, 1933, pp. 525-537, 5 figs.

A METHOD is given for the calculation of a helicoidal ventilator placed within a tube of known aerodynamic resistance. The author first considers the propeller working alone inside the tube and establishes the condition that the path of the fluid particles must be on cylindrical surfaces coaxial with the propeller. He then puts forth the condition that the ventilator blades must be at constant circulation along the radius. After writing the total thrust which must be developed by the propeller in functions of the total resistance of the circulation, both for the friction on the walls of the tube and for internal friction corresponding to its own viscosity, he deduces the expression for the efficiency. He then takes the case of a counter-propeller placed behind the first propeller which completely straightens the streamlines, and sets forth a method of calculation for both propellers.

Spinning

Further Experiments on the Spinning of a Bristol Fighter Airplane, A. V. Stephens. (British) Aeronautical Research Committee—Reports and Memoranda No. 1515, July 26, 1932 (published June 30, 1933), 22 pp., 18 figs.

FROM THE EXPERIMENTS described it appeared that the Bristol Fighter airplane eventually attained a definite spinning attitude whatever method of entry was employed. Loading the longitudinal axis of the airplane induced slower and steeper spins, whereas loading the wing tips had the opposite effect and the difficulty of recovery was much increased. The generality of these effects was uncertain. Reducing the rudder angle invariably decreased the incidence of the spin, but moving the elevators down increased the rate of spin and had little effect upon the incidence. The outstanding difficulty in explaining the equilibrium of the spin lay in the balance of rolling moments (chord axes), and further work on this point is required.

Tail Buffeting

A German View of Buffeting, H. Blenk. *Aircraft Engineering*, Vol. 5, No. 51, May, 1933, pp. 113-115, 9 figs.

TECHNICAL OPINION in Germany did not agree with the British verdict that the accident to the Junkers monoplane at Meopham was due to buffeting. (The British report was previously abstracted in AERO DIGEST.) In this article a member of the Deutsche Versuchsanstalt fuer Luftfahrt staff examines the latest investigations made by the British National Physical Laboratory, compares them with the German investigations and gives his reasons for casting doubt on the British view.

(Continued on page 70)

NEW EQUIPMENT and METHODS

"Pigmy" Precision Ball Bearings

• THE NORMA-HOFFMANN Bearings Corp. of Stamford, Conn., includes in its standard line two bearings that are of special interest because of their diminutive size. These are the "N-463," with $\frac{1}{8}$ -inch bore and $\frac{3}{8}$ -inch outside diameter, and the "4666," having a $\frac{3}{16}$ -inch bore and $\frac{1}{2}$ -inch outside diameter. Despite their small dimensions, these contain, respectively, 12 and 17 balls of $\frac{1}{16}$ -inch diameter, with inner and outer rings finely ground and finished. These bearings are used extensively, both for rotating and oscillating loads, in precision instruments, and in similar light applications where the utmost accuracy and sensitiveness are essential.

Aerial Advertising Sound Apparatus

• ERNEST T. TREEN, sound engineer for the Aero Advertising Corp. of America at Santa Monica, Calif., has developed a portable sound unit of light weight and capable of a power output of more than 200 watts for broadcasting from an airplane. Clear ground reception of broadcasts has been recorded at varying heights up to 5,000 feet. Power for the apparatus is supplied by two wind-driven generators, attached to the airplane struts, one on one side generating 1,000 volts and the one on the other side 1,500 volts.

This equipment has been installed in the corporation's tri-motored Ogden Osprey, which also tows a banner for advertising purposes. The mast which supports the banner has a manual release, controlled from the plane's cockpit, and take-offs and landings with a banner are made without aid on the ground.

Wilhelm Automatic Wind Tee

• AN ARROW-SHAPED wind tee that indicates wind direction when the wind velocity is above five miles per hour and shows runway direction when the wind velocity is less than five miles is produced by Arthur M. Wilhelm of Randolph, N. Y. It is 23 feet long, finished in bright orange and lighted at night. Moving parts are automatically lubricated, and the tee continues to operate regardless of weather conditions.

The main shaft of the tee is so mounted as to have a slight vertical motion and is supported when at rest by two rollers at the lower end, running on a circular track having low points to correspond with the runways of the field. About halfway between are high points

or peaks, and when giving wind direction, the tee is supported by the hydraulic principle which holds the rollers up and practically clear of the track so that the tee is free to turn with the wind.

Starting with the tee at rest on a runway, if the wind of a different direction starts to blow, it turns the tee, which causes the rollers to rotate around on the circular track and up the inclines toward the peak, thereby raising the shaft and tee slightly. This raising motion draws oil from a reserve reservoir through a check valve and supports the tee, thereby leaving it free to turn as long as the wind blows.

Beneath the wings of the tee are two flippers which are held back by the force of the wind. These flippers are connected to a release valve which controls the flow of oil from the compression chamber. When the wind velocity drops to approximately five miles per hour or less, these flippers drop to normal "no wind" position and open the release valve, which in turn lets the oil out of the compression chamber and allows the main shaft to lower so that the rollers come into contact with the cam or circular track. The weight of the shaft, tee, etc., causes the rollers to roll down the inclined surface of the track to the nearest low point, thereby turning the tee to the corresponding runway direction.

Airport Floodlight Of 36-Inch Diameter

• THE PYLE-NATIONAL CO. of Chicago, Ill., has recently added to their line of airport lighting equipment the Type 36,000 GRL floodlight.

This projector is designed especially to use the 5,000-watt, 115-volt, type G-64 bi-post base airport lamp. The projector is 36 inches in diameter, with an Armco iron case, cast aluminum door frame, cast steel yoke and base, and non-ferrous metal focusing device and incidental fittings. A silvered glass reflector, 38 inches in overall diameter, is used.

These projectors can be equipped with Pyle-National rectangular divergence lens of heat-resisting glass, providing a 50-degree spread in one direction, or with clear heat-resisting door glass. The floodlight uses the 5,000-watt type G-64 airport lamp, rated 100 hours for airport service. It will also accommodate the same type lamp rated 750 hours for general commercial floodlighting. Approximately 8,400,000 apparent beam candlepower is provided.

This floodlight projector has been especially developed by the Pyle-National Co. for modern "end of runway" type lighting. It has been used by one of the most active airports.

Testing Device For Crankcase Oil

• THE LUBOSCOPE developed at the factory of the Universal Microphone Co. at Inglewood, Calif., magnifies and electrically illuminates specimens of oil or other material spread on a slide and inserted in the device. When used for crankcase dilution tests, it shows up dirt, steel, carbon and other particles.

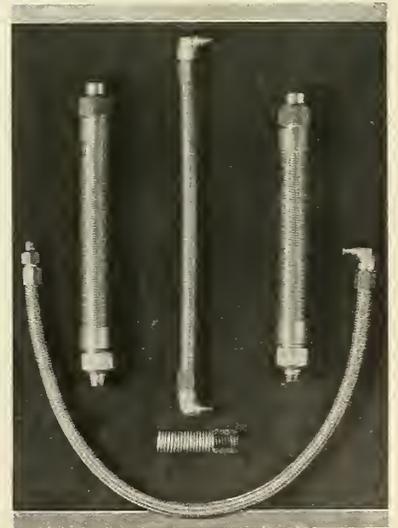
Flexible Seamless Aluminum Tubing

• THE SEVERSKY SEV-3 that recently made an unofficial world speed record for amphibians employs flexible seamless aluminum tubing for oil and gasoline lines, produced by the Seamlex Corp. of Long Island City, N. Y. By its use a weight saving of approximately 12 pounds was effected.

Three sizes of tubing were used: $\frac{3}{8}$ -, $\frac{1}{2}$ - and one-inch inside diameter. The picture illustrates some of the larger lines, and a short piece of the corrugated inner tube is shown in cross-section. It consists of a one-piece seamless aluminum tube, containing neither joints nor packing. The deep double S corrugations give the tubing exceptional flexibility and resiliency designed to absorb vibration.

The ends of the corrugated tubes are drawn down to straight uncorrugated ends and flared to receive the fittings. These are of duralumin of the flared-tube type, solderless, brazeless and packless. They have a union effect. The metallic braid covering is provided for external wear and reinforcement of inner tube.

This tubing was tested to 1,000 pounds per square inch, hydrostatic pressure.



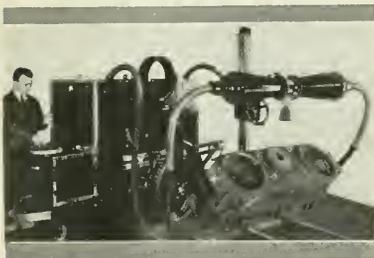
Various types of Seamlex tubing

Portable Industrial X-Ray Apparatus

• WITH THE CONSUMMATION of arrangements between the Industrial X-Ray Corp. of Los Angeles, Calif., and the N. V. Philips Corp. of Eindhoven, Holland, complete portable Industrial X-Ray equipment is now being introduced in the United States. The Industrial X-Ray Corp. has acquired the manufacturing and distributing rights to all Metalix X-ray apparatus.

The device has been used in Europe for years with more than 3,000 standardized units operating. With it manufacturers can determine the quality of raw materials prior to their manufacture, reveal defects heretofore hidden from surface inspection and as a result revolutionize production processes, in many instances eliminating waste effort with a consequent reduction of manufacturing costs. The Metalix machines are designed to X-ray wood, steel, metal, concrete, clay products, textiles, or any manufactured or fabricated product.

The "Metalix 200," the largest of three sizes constructed at the present time, is



The Metalix X-ray apparatus in use

mounted on a two-wheeled trailer, permitting its transportation to any location. Inside the workshop or on board ship, a suspension crane can convey the apparatus from place to place. This large type, like the smaller sizes, can be connected direct to a 220-volt a-c outlet or to a 440-volt power main.

The apparatus itself consists of three components: High-voltage generator, constructed in a metal container; control box built against this container, incorporating the necessary switches and regulating and measuring controls; two shockproof high-voltage cables, which connect the transformer to the rayproof and shockproof Metalix tube.

The following materials may be examined: Iron up to 3½ inches thick (with special apparatus up to four inches); copper, bronze and glass up to 2½ inches, and aluminum up to 10 inches. Complicated objects, such as cylinders, shafts, axles and pistons, may be radiographed with this apparatus, and large cast objects, rolled material and welded material may all be examined through it.

One of the most important factors in the device lies in the fact that it is designed to operate so that only the primary useful beam of X-ray emits and biologically harmful rays are absorbed at the source. Previous difficulty in eliminating the danger of harmful rays and the danger of high-tension wires has prevented X-ray methods developed many years ago from being applied to industry before this time. The Metalix apparatus is designed to eliminate both unwanted radiation and the necessity of working with high-tension wires. Simplicity of design has been established without the sacrifice of essentials, and the unit complies with all International Safety regulations. Of sturdy construction throughout, a long life is reported to be assured, combined with a low cost of operation.

Spray Painting Gun With Easy Control

• THE DeVILBISS Type MB spray gun incorporates "feather touch control" by the use of a new air trigger with a shorter trigger movement to insure easier operation. It features unrestricted air passage, to give better atomization.

The Type MB gun owes its ease of operation to an air piston, which relieves the spring tension on the fluid needle when the air valve is open. This permits the use of strong spring pressure to close the needle, yet trigger pull need be only strong enough to open the air valve. Trigger pull does not compress the strong needle seating spring; air pressure does it automatically, without any effort on the part of the operator.

The unrestricted air passage on the MB gun allows a greater volume of air in the head and, as a result, atomization at a lower air pressure. With this gun the air is distributed evenly in the cap, eliminating excess fumes and thereby decreasing material costs. In addition, since it demands less air pressure, a smoother, more even finish is obtained than has been heretofore possible.

Another feature of the Type MB gun is the improved ball and cone principle, which is designed to assure proper concentricity of the fluid tip and the air cap as well as to protect the surfaces of contact against wear. It automatically maintains spacing and alignment of nozzle parts and promotes uniformly finished surfaces. The graduated spray width adjustment has been improved through the addition of larger air passages in port openings, so that a greater volume of air is available at the point where the spraying is done. Clearly indicated graduations allow the operator to control the width and character of the spray easily. The removable spray head has been simplified to a greater extent than before. It makes cleaning an easy, quick operation and facilitates a quick

change from one material to another. It prevents misalignment of fluid needle and tip and uneven wear at the end of the needle.

Compass Checking Device Developed at School

• A DEVICE for the checking and compensation of compasses has been developed by Norman Anderson, chief of the Executive and Transport Pilots' Ground School at Parks Air College, East St. Louis, Ill. The device cuts down the time required from approximately three hours to less than 15 minutes.

The instrument is designed to be both light and portable. It is mounted on the wing or any nearly level portion of the airplane which has a straight edge at a known angle to the fore-and-aft line of the ship. By use of the instrument, the compass can be compensated and checked at 30-degree stations in about 15 minutes with an accuracy within ½ degree.

The principle of the instrument is similar to the pelorus of seagoing craft. It has a sighting piece 24 inches long, mounted on a vertical shaft so that the two move together. At a lower station on the shaft is attached a pointer, which moves over a rotatable graduated disc, which is graduated in 30-degree units from 0 to 330 degrees, clockwise and counter-clockwise. An index mounted on the frame base is graduated into degree units to permit any degree setting of the disc.

A convenient corner of the airport, at least 100 feet from the nearest steel structure, is selected, where a stake is driven. When the sun bears true east, the operator observes the sun with the instrument and moves the sighting piece, holding the same bearing to find a ground object which is also due east. If variation is east, he selects a magnetic bearing point south of the true by the angle of variation. A west error is corrected in the opposite way. The operator makes a record of this point, which is due east magnetic, and uses it for reference. The bearing of several prominent objects in the vicinity may be determined, for use in case one is obscured. The objects should be at least 2,000 feet distant from the stake.

The rotatable disc is set to 90 degrees, and the sighting pointer to zero. In this position the ship, with the tail up on a dolly, is pulled around until the object selected comes into the sights. The instrument should be over the stake, but a variation of 10 feet will not introduce any appreciable error. In this position, the compass is set to zero by the compensator. The pointer is set to 90 degrees, the ship swung until the selected object comes into the sights and the compass set to east. The rest of the corrections are made in the same manner.



Gipsy-Powered Fairchild "22"

• Kreider-Reisner Aircraft Co. Inc., Hagerstown, Md., a subsidiary of Fairchild Aviation Corp., has produced another model of the standard "22," powered with the Wright Gipsy 90-horsepower engine. The Gipsy "22" brings this plane into the lower price class.

The fuselage structure is of chromemolybdenum steel tubing with square tubing used for longerons and many vertical members, and round tubing used for remaining diagonal and horizontal members. This method of construction reduces the cutting, fitting and welding of members and results in greater strength. The cockpits are tandem, large and roomy.

The pilot's controls are of simplified design. All of the control mechanisms are supported or mounted in ball bearings, and are designed to require no attention for the life of the plane.

The wing is constructed in two units.

The spars are of the I section, consisting of center web and cap strips of spruce. The spars are interconnected by a combination of duralumin and built-up steel tube trusses and square drag wires. Wing fittings are cadmium plated or baked enameled, and have been designed to require very little welding.

The Wright Gipsy engine is supported in rubber on two bearer tubes in the conventional manner. The side and top cowling is easily removed and gives access to any part of the engine. A hand-turning starter is furnished as standard equipment.

The landing gear is of the split-axle type, having the unusually wide track of 7 feet 7 inches. The shock absorbers are of the oil and spring type, having a total travel of 8 inches. Removable bronze bushings are used in all landing gear attachments, while the universals at both ends of the oleo struts are chromemolybdenum steel, drop-forged. Brakes of simple and positive action are operated from the rear cockpit, but can easily be attached to the rudder pedals in the front cockpit.

The instrument board has been espe-

cially designed for Fairchild and is a self-contained unit mounted on rubber. The instruments furnished include: air speed indicator, oil pressure gauge, oil temperature gauge, altimeter, tachometer, compass and ignition switch. Additional instruments can easily be installed in the panel.

Specifications

Wing span	32 feet 10 inches
Wing chord	5 feet 6 inches
Wing area	170 square feet
High speed	110 miles per hour
Cruising speed	93 miles per hour
Landing speed	42 miles per hour
Rate of climb	600 feet per minute
Service ceiling	13,000 feet
Weight, empty	992 pounds
Gross weight	1,550 pounds
Useful load	610 pounds
Wing loading	9.1 pounds per sq. ft.
Power loading	17.2 pounds per h. p.

Recent Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N.W., Washington, D. C.

Method and apparatus for smoke signaling from aircraft. Theodore S. Wilkinson, Washington, D. C. (1,912,392)

Automatic steering device. Nicolai Minorsky, Merion, Pa., assignor to Pioneer Instrument Co. (1,912,489)

Airplane instruction device. Theodore M. and John L. Pardue, St. Louis County, Mo. (1,912,721)

Aerial aircraft carrier and airplane landing and launching appliance. Willis J. Perkins, Grand Rapids, Mich. (1,912,722 and 1,912,723)

Shock-absorber for airplane landing gear. Clinton H. Havill, South Orange, N. J., assignor to Bendix Research Corp. (1,912,840)

Aircraft carburetor and fuel supply system. Leonard S. Hobbs, Hartford, Conn., assignor to Bendix Stromberg Carburetor Co. (1,912,842)

Direction-indicating beacon. Oscar Werner, South Bend, Ind., assignor to Westinghouse Electric & Mfg. Co. (1,912,928)

Propeller. Clinton H. Havill, assignor to Eclipse Aviation Corp. (1,912,979)

Ornithopter wing structure. Charles W. Strobell, San Diego, Calif. (1,913,011)

Automatic variable-pitch propeller. Chandley W. Lambert, Cleveland, Ohio. (1,913,123)

Method and means for indicating altitude from aircraft. Ernst F. W. Alexander, Schenectady, N. Y., assignor to General Electric Co. (1,913,148)

Wing and like member for aircraft. Emil F. Marton, Seymour, Conn. (1,913,169)

Airship bulkhead. Karl Arnstein and Paul Helma, Akron, Ohio, assignors to Goodyear-Zeppelin Corp. (1,913,325)

Airplane wheel. John R. Eaid, Chicago, Ill. (1,913,435)

Means for energizing the boundary layer on aircraft parts. Edward A. Stalker, Ann Arbor, Mich. (1,913,644)

Device for carrying bombs and other heavy bodies on and releasing them from aircraft. Juris Fritson and Arnold Viksne, Riga, Latvia. (1,913,708)

Propeller. John Squires, Hagerstown, Md. (1,913,733 and 1,914,346)

Control flap and balance. Leslie R. Tower, Seattle, Wash., assignor to Boeing Airplane Co. (1,914,000)

Retractable landing gear. Knut Henrichsen, Garden City, and Samuel T. Payne, Freeport, N. Y., assignors to Curtiss Aeroplane & Motor Co. (1,914,092)

Airplane propeller. Marcellus E. Smith, Los Angeles, Calif. (1,914,332)

Mooring mast. Paul H. Douglas, Cleveland Heights, Ohio, assignor to Wellman Engineering Co., Cleveland. (1,914,408)

Elevating and steering means for airplanes. Edward J. Murray, Philadelphia, Pa. (1,914,448)

Landing deck for aircraft. Frederic F. Kookogey, New York, N. Y. (1,914,573)

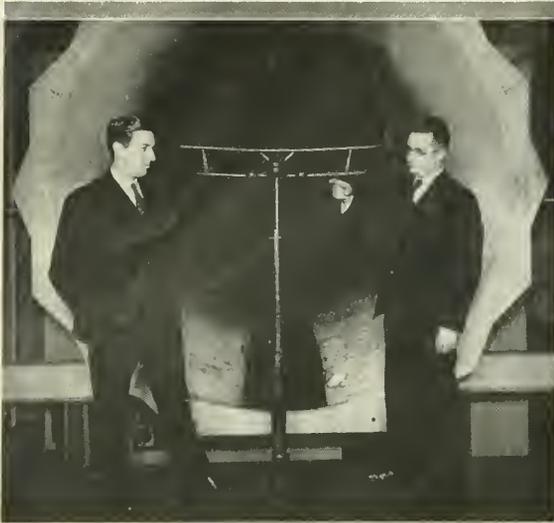
Propeller mounting for airplanes and the like. Spiros S. Varkas, New York, N. Y. (1,914,763)

Helicopter. Arthur M. Young, Radnor, Pa. (1,915,209)

Aircraft compass. Gerhard R. Fisher, Palo Alto, Calif., assignor to Federal Telegraph Co. (1,915,274)

Airport. Hermann F. Cuntz, New York, N. Y. (1,915,297)

Slotted ring cowling for air-cooled engines. Walter S. Diehl, U. S. Navy. (1,915,298)



● Seventeen months of preliminary research by the Curtiss Aeroplane and Motor Company preceded the actual construction of the new 15-passenger Curtiss-Wright Condors. A fleet of these transports powered by Wright Cyclone 700 horsepower engines recently inaugurated American Airways' high speed service between Chicago and New York over the new Valley Route, reducing the flying time to a little more than 5½ hours, and within the past month Eastern Air Transport has established a new 95-minute express service between New York and Washington with their planes.

The first 18-passenger Condors, powered by two Curtiss Conqueror engines, were developed in 1929 at the experimental factory of the Curtiss Company, Garden City, New York. This development was the result of extensive study and research of transport airplane design, with a view of obtaining a superior type in regard to speed, passenger comfort, quietness of operation, and aerodynamic refinements. Five of the six original Condors are still in service on Eastern Air Transport.

The Curtiss engineering staff at Buffalo, New York, headed by T. P. Wright, vice-president and general manager, made all of the wind tunnel tests and projected the curves illustrating the advantage of the new type from an economical standpoint. The preliminary research investigation included a detailed study of the stability characteristics of the new Condor; the effect of the fuselage shape and the effect of various wing and tail surfaces and landing gear arrangement. This exhaustive study decided the design type best suited to the requirements of present air transportation from a combined standpoint of safety, comfort, economy and speed.

R. E. Johnson, of the aerodynamics section, and T. P. Wright, vice president and gen'l manager

Passengers embarking in one of the Condors on the American Airways route



The Value of Wind Tunnel Tests

In the course of this engineering development, seven entirely different models were constructed and tested in the new Curtiss wind tunnel. This tunnel has a diameter of 8 feet at the entrance cone of the test section, and it is said to be the largest wind tunnel in the United States operated by a commercial aircraft builder. In general operation the wind tunnel is run at 80 miles per hour, but it can be operated at 120 miles per hour.

The wind tunnel operator can weigh to within one ten-thousandths of a pound the forces transmitted from the model mounted above in the wind tunnel. The complete model can be tested, or individual parts of an airplane. By the use of this wind tunnel, engineers were able to predetermine every flying characteristic of the new Condor before it was built.

The development of the new Condor represents a splendid example of the precision engineering; while the design was still on the drafting board, the engineers

estimated that it would have a maximum speed of 171 miles per hour. When the ship was completed and test flown, it proved to have a top speed of 171.3 miles per hour.

Soundproofing the Cabin

While the engineering development was under way, the Sperry Gyroscope Company made extensive researches in soundproofing in general; sound deadening materials and methods of eliminating objectionable noises in the airplane at their source. An acoustical laboratory was set up in the Sperry Building; measuring instruments were built and many intricate tests were conducted.

When the first of the new Condors was completed and test-flown, the Sperry engineer in charge of acoustical and insulation arrangements was able to make a comparison with other transports, as well as Pullman cars. He found, by the use of a noise meter, that a well-known tri-motor, all-metal monoplane transport had a decibel count of 105; a Pullman car (on a good roadbed, under favorable

Engineering Developments of the Curtiss-Wright Condors

conditions) had a decibel count of 75. The new Condor also recorded 75 decibels—exactly the same as the average Pullman car.

Some of the Construction Features

The Curtiss engineering personnel who had followed all research from the original design were transferred to the Curtiss-Wright Airplane Company, Robertson, Missouri, where the entire production program and all actual design have been carried on under the direction of Ralph Damon, president, and George A. Page, chief engineer of the Curtiss-Wright Airplane Co.

General descriptions of the Condor were published in the February and May issues of AERO DIGEST but the following notes will serve to amplify the data previously given.

Cabin Heating and Ventilation

The passenger and pilot compartments are heated in cold weather through a seamless, stainless-steel tube approximately 6 feet long, around which the hot exhaust gases from the engine circulate, thoroughly heating the air inside the pipe. This warm air enters the passenger compartment near the floor, from either side, and rises to the ceiling where it is discharged through two large ceiling ventilators. There are individual control outlets under each outer seat which enable passengers to regulate the volume of incoming heated air. The pilot is kept advised of the cabin temperature by a thermometer on the instrument board.

During warm weather the heating arrangement is converted into a cooling system, through which cool air is permitted to enter the cabin directly, in addition to that coming through the cold air ducts. Both the hot and cold air ducts are insulated so as to eliminate noise.

The hot air pipes consist of an inner pipe, which is perforated, and an outer shell of stainless steel. The space between the perforated pipe and the outer shell is filled with spun glass to deaden noise. Felt is used as the silencing material in the cold air pipes. "Seapak" insulating material is used to sound-proof the cabin.

Two large air ducts insure a complete change of air in the cabin every three minutes throughout flight.

Landing Gear

The landing gear of the new Condor is over 20 feet in width. It is equipped with a long stroke oleo action, mechanical brakes, Timken roller bearings in the wheels, and low pressure safety tread tires 42 inches in diameter.

There are three main members in a conventional tripod landing gear. Only one of the three members, in the Condor gear, is affected by the retractable feature. The rear radius strut of this landing gear has a joint midway of its length—the upper half of the strut being connected to a low pitch, irreversible screw. This screw, operated by an Eclipse electrical motor, lifts the upper half of the strut, which in turn folds the entire landing gear upward and back into the nacelle cowl behind the engine. When fully retracted all of the landing gear is concealed, except a small portion of the tire. The action of the gear, either retracting or extending, requires about 40 seconds for full travel in either direction. The action can be operated at the full speed of the airplane.

Each side of the landing gear operates and is controlled entirely independent of the other. In addition to the electrical drive there is also an independent mechanism which can be operated manually

by the pilot, thus insuring complete reliability of operation at all times.

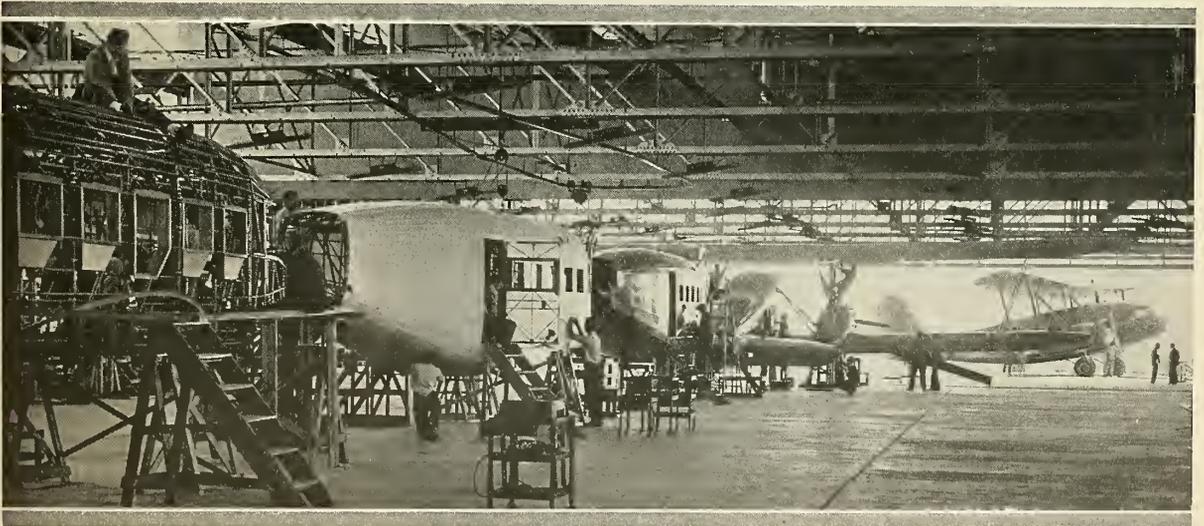
Either pilot can raise the landing gear, immediately after the takeoff, by pulling up on the gear control handles on the cockpit floor. While the gear is in motion a white "tell-tale" light, on each nacelle, connected as an integral part of the motor circuit, flashes until the gear is fully retracted. The motor is automatically stopped at the upward end of the gear stroke.

The wheels are visible to the pilot and co-pilot when the landing gear is down. A white mark on the rear strut by day, and a green light by night, indicate whether or not the gear is fully extended. In addition to this simple safeguard, a signal system, consisting of colored lights and a warning bell interlocked with the engine control, is provided to inform the pilot of the exact position of the landing gear. If the landing gear is retracted when the throttles are cut below the minimum revolutions required to sustain altitude, a warning bell rings. Simultaneously two red lights flash on the instrument board. The bell and light signals continue until the gear has been completely lowered or the throttles opened sufficiently so as to sustain flight.

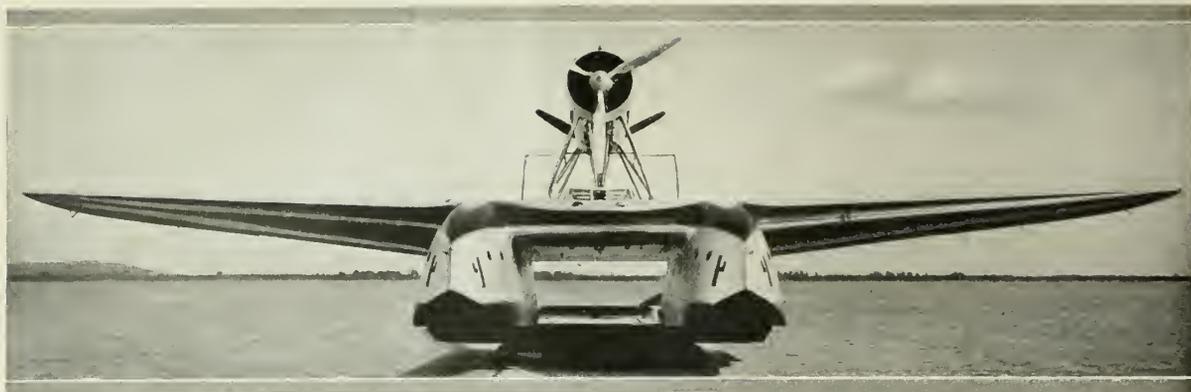
When the gear is in an extended position two green lights flash on the instrument board, which, in addition to the pilot's being able to see the position of the wheels, provides additional insurance that the gear is fully extended.

Power Plant

The new Condors are powered by two Wright Cyclone D-1820 geared engines, either of the model F-1 type, which develops 700 h.p. at 1950 r.p.m., or the model F-11 type, which develops 675 h.p. at 1950 r.p.m.



Assembly line of Curtiss Condors at the well-equipped Curtiss-Wright factory in Robertson, Missouri



Savoia-Marchetti S.55X Seaplane

● The type of airplane used in the cruise of 24 Italian planes, under the direction of Air Minister General Balbo, to the "Century of Progress" Exposition is the type S.55 seaplane designed by Engineer Alessandro Marchetti and constructed by the Societa Idrovolanti Alta Italia (North Italy Seaplane Company). The model which is designated as the S.55X is the result of long experience in seaplane construction which has enabled the Italian engineers to produce a most efficient plane for long-range trans-ocean flights. General Francesco de Pinedo made a flight over the South Atlantic in a plane of this type in February, 1927. Under General Balbo's leadership 11 similar planes flew in formation from Rome, Italy, to Rio de Janeiro, Brazil, across the South Atlantic Ocean in December, 1930.

The S.55X is a twin-motored thick-winged cantilever monoplane with engines mounted in tandem. One of its unique characteristics is that it has two boat hulls; it differs from the S.55 military model, flown in the South Atlantic cruise of 1930, not only in the type of engines used, but also in several other important modifications which have reduced air resistance and resulted in a general increase in efficiency in actual operation. A faster, stronger, more streamlined plane, with a greater cruising range than its predecessors, has been achieved. These improvements were brought about by protracted and methodical research in the course of which thousands of experimental flights were made under varied conditions. The difficulties of the flight to Chicago in comparison with the South American flight required that more rigid trials and tests be made of every piece of mechanism, propellers, engines, radiators, tanks and instruments. For example, the three-bladed metal propellers were selected after experiments were made with 88 different types. Eight-

teen types of radiators were tried and compared, both in actual flight and in bench tests, mounted before the engine and on the hulls. The Isotta Fraschini engines were selected because of their dependability, lightness and smoothness of operation.

The main wing is in three sections, the central section including the two hulls to which the outer wing panels are attached, the latter being tapered in plan form and thickness. Three main spars are employed in the structure with plywood ribs and covering. Eighteen watertight wing compartments assure buoyancy in the event of a forced landing.



Radio equipment in the S.55X

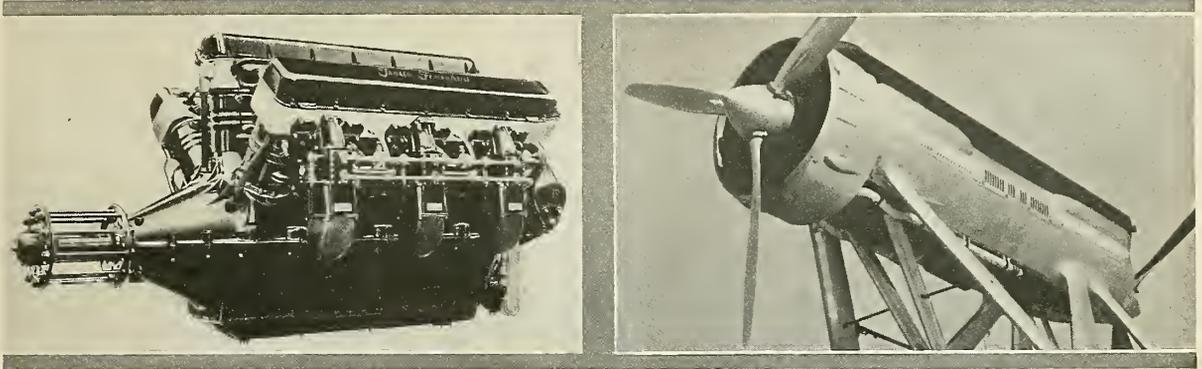
The short hulls are constructed with ash, spruce and plywood. Below the water line the plywood covering is doubled, with doped fabric between the two skins. Two cantilever outrigger units carry the tail, which consists of an adjustable horizontal stabilizer, one-piece balanced elevator, two fins and three rudders.

Oval and cylindrical fuel tanks used have greater capacity and strength than the octagonal ones used in the previous models. In addition to improvements in the engine cowls, many other modifications have been introduced to secure minimum resistance and permit accessibility for adjustment and repair. Among the most important improvements is the construction of the superstructure between the hulls which forms the central section of the wing and contains the pilots' compartment, controls and navigation instruments. The windshield of the control room has been enlarged and curved to fair in with the top contour lines of the wing.

Among the special navigating instruments installed are the following:

The Nistri-Bisco control board, which contains air-speed meter, compass, altimeter and turn indicator; these instruments are viewed by the pilot through a magnifying panel which permits easy and precise observation of variations in direction, and thus accuracy is obtained without the employment of mechanical countershafts and with the consequent reduction of mass inertia. The Sperry artificial horizon shows, through a gyroscopic indicator, variation from a set course, both longitudinally and transversely and the Sperry direction indicator permits controls to be set for any desired direction.

The fuel tanks in the starboard hull consist of seven oval 83-gallon tanks, two oval 106-gallon tanks and a cylindrical tank having a capacity of 40 gallons. The



One of the Isotta Fraschini 880 h.p. engines and the twin-engine installation on the S.55X

port hull has similar tanks except for the omission of two 83-gallon tanks in the forward compartment, used for the radio. Thus the total fuel tankage is 1,500 gallons. (See diagram on page 48.)

Specifications

- Wing span 71 feet 11 inches
- Length 54 feet 2 inches
- Height 16 feet 5 inches
- Maximum wing chord.....16 feet 3 inches
- Wing area 990 square feet
- Weight empty 12,650 pounds
- Maximum speed 175 miles per hour
- Cruising speed 145 miles per hour
- Fuel consumption..... 1.37 pounds per mile
- Maximum cruising range..... 2,800 miles
- Normal cruising range..... 2,250 miles
- Climb to 3,200 feet..... 2 minutes 24 seconds
- Climb to 6,500 feet..... 9 minutes 9 seconds
- Climb to 16,400 feet..... 50 minutes

The engine used is the water-cooled Asso 750 constructed by the Isotta Fraschini Works. Its 18 cylinders are arranged in three banks of six, the banks disposed at a 40-degree angle of convergence.

The crankcase is of electron, and cylin-

ders are of carbon steel with the cooling jackets babbitted and welded.

Pistons of special aluminum alloy have four rings, and the six crank arms are bored to allow lubrication of the connecting rod big ends, which are machined from special steel of high resistance.

Ignition is supplied by two Marelli M. F. 18 high-tension magnetos.

The water-cooling system has a forced circulation by means of centrifugal pumps and lubrication is fed by force through the medium of gear pumps, one supplying the oil and two for scavenging. Six Stromberg carburetors are fitted.

Italy has no petroleum production and hence must go abroad for the necessary fuel supplies. Before deciding on any particular brand of fuel, a series of severe tests, running over a period of some months, were undertaken. It is interesting to note that an American fuel, Stanavo aviation gasoline, was the one finally chosen, not only because of its satisfactory performance, but also because it is marketed by an organization with

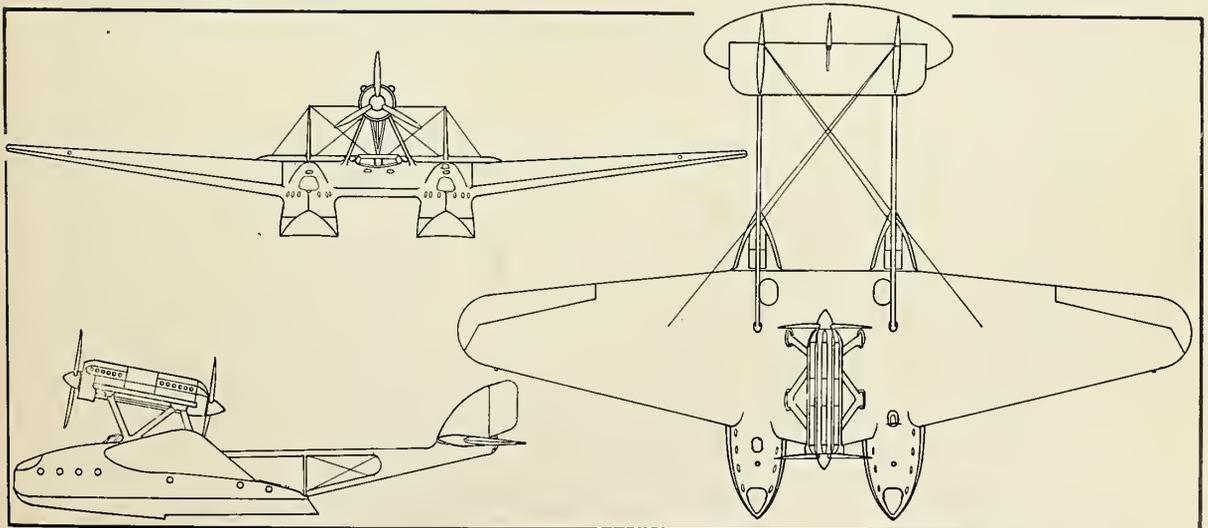
distribution facilities to take care of servicing the fleet of seaplanes at the remote points in Iceland, Greenland and Labrador along the route of the flight.

The three-bladed metal propeller has a variable pitch which may be set while the ship is at rest, and is designed and built especially to resist severe atmospheric conditions.

Cooling radiators are in two independent halves, one for the forward engine and one for the rear. In the event of damage, one part may be replaced without the necessity of dismantling the entire radiator.

Engine Specifications

- Bore 5.5 inches
- Stroke 6.7 inches
- Number of cylinders 18
- Total displacement..... 2,880 cubic inches
- Compression ratio 5.7:1
- Normal power to 1,750 r.p.m..... 880 b.h.p
- Maximum crankshaft speed..... 1,900 r.p.m.
- Maximum power at 1,900 r.p.m.. 940 b.h.p.
- Normal fuel consumption... .475 lb. h.p. hr.
- Normal oil consumption... .022 lb. h.p. hr.
- Weight dry without hub..... 1,460 lbs.
- Weight per horsepower..... 1.66 pounds



Scale outline drawings of the Italian Savoia-Marchetti S.55X seaplane

AERONAUTICAL INDUSTRY

International Races Next Month

INVITATIONS to send entries to Chicago, Ill., for both the heavier- and lighter-than-air events in the International Air Races and Gordon Bennett Balloon Race have been extended to the thirty-three nations having aeronautical societies affiliated with the Fédération Aéronautique Internationale, it was announced last month. The two air meets will be held September 1-4 at the Curtiss-Wright-Reynolds Airport.

An international free-for-all for a \$10,000 cash purse, including lap prizes, will be a feature of the heavier-than-air events for both men and women pilots. This race, which is scheduled for Labor Day, will require twenty laps around a ten-mile closed course. The qualifying speed will be 225 miles per hour. Held under the sponsorship of the *Chicago Daily News* and the management of the International Air Races, the meet has a guaranteed minimum of \$35,000 in prize money, it is stated.

Several free-for-alls will be held daily for airplane categories classified according to engine displacement. The pilot accumulating the greatest number of points during the four days of competition in his own classification and who has continuously flown the same ship in each of the four races which make up the sweepstake award will be winner of the sweepstake award given for his plane's category. A similar arrangement will prevail for parachute jumping contests, one of which will be held daily. Army, Navy and Marine Corps flying and aerobatics are also planned.

The International Gordon Bennett Balloon Race is scheduled to start on the afternoon of September 2. Carrying with it a total purse of \$2,000 in addition to the Gordon Bennett Trophy, this event will be competed in by representatives

of several nations, it has been reported. Lieut.-Comdr. T. G. W. Settle, U. S. N., who won the trophy last year for the United States, will be a contestant in the race this year for the Navy. Lieut. Wilfred J. Paul and Master Sgt. Joseph H. Bishop will represent the Army.

Aircraft Conference Postponed

THE CONFERENCE of the Aeronautics Branch of the Department of Commerce with aircraft manufacturers at Washington, D. C., which was scheduled to be held July 27, was postponed last month to a later date, probably sometime this month. The exact date of the conference, which is to be held for the purpose of discussing the airworthiness requirements for aircraft, had not been set as AERO DIGEST went to press.

Curtiss-Wright Exports Are \$2,500,000

THOMAS A. MORGAN, president of Curtiss-Wright Corp., last month announced the receipt of export orders amounting to \$2,500,000 since January 1, a total equal to the entire export business during 1932.

The 1933 export orders included 54 Curtiss Hawks, powered by the new 700-horsepower Wright Cyclone engine; nine Curtiss Falcon two-seat observation biplanes, also powered by the new Cyclone; nine Whirlwind-powered Curtiss-Wright training planes and four Curtiss-Wright Ospreys, powered by a 420-horsepower Wright Whirlwind engine, and thirty 700-horsepower Cyclone engines.

Mr. Morgan stated that great progress has been made during the past two years in selling planes and engines to countries who in the past have not purchased American-built equipment. The entire 101 planes sold are repeat orders from countries who purchased Curtiss-Wright planes in 1931 and 1932.

Pilots, 17,958; Aircraft, 6,874

TOTALS of 17,958 pilots and 6,874 aircraft holding active Department of Commerce licenses were reported on July 1, according to an announcement last month by the Aeronautics Branch of the Department of Commerce. The total number of aircraft, licensed and unlicensed, of which the Department had record on July 1 was 9,055. Unlicensed craft, bearing identification numbers only, totaled 2,181.

Among the 17,958 persons holding pilots' licenses as of July 1, there were 7,040 of the transport grade, 1,167 limited commercial, 22 industrial, 9,381 private, and 348 solo pilots. The licensed pilots included 573 women.

Leading the states in the number of aircraft, licensed and unlicensed, was California with 972. New York was second with 925, and Pennsylvania third with 542. Considering licensed aircraft only, New York led with 826, California followed with 807, and Pennsylvania was third with 460. The greatest number of unlicensed aircraft was in California, where there were 165, while Michigan had the next greatest number, 125, and Texas was third with 123. In the number of licensed pilots, California led with 3,460, New York was second with 1,716 and Ohio third with 1,088.

The study also included gliders and glider pilots. It was found that the number of licensed gliders was 55, and unlicensed gliders, 754, making a total of 809. Licensed glider pilots numbered 193. The greatest number of gliders in a single state was in California, where there were 142. New York and Ohio were tied for second place with 67 each, and Michigan was third with 65. California also led in the number of licensed glider pilots with 40, while New York had 29 and Ohio was third with 24.

Coming Events

Aeronautical exhibit at A Century of Progress Exposition, Chicago, Ill. Continued to NOV. 1.

Conference of Aeronautics Branch, Department of Commerce, and aircraft manufacturers at Washington, D. C., to discuss proposed changes in airworthiness requirements for aircraft. Tentative, AUGUST, postponed from July 27.

German air sport exhibition at Hamburg, Germany. AUGUST.

Air cruise of private planes from Philadelphia to Sky Top, Pa. WEEK-END of AUGUST 19.

Air cruise of planes from Roosevelt Field, Mineola, L. I.,

N. Y., to Montreal, Quebec.

WEEK-END of AUGUST 19.

Canadian Air Pageant at St. Hubert Airport, Montreal, Quebec. AUGUST 19-20.

Air show at Milwaukee, Wis., in connection with the national convention of the Veterans of Foreign Wars.

AUG. 27-SEPT. 1.

International Automotive Engineering Congress under the auspices of the Society of Automotive Engineers at the Palmer House, Chicago, Ill.

AUG. 28-SEPT. 4.

Gliding competition at Banne d'Ordanche, France.

AUG. 30-OCT. 3.

Air show at Milwaukee, Wis., in connection with the national convention of the Exchange Clubs of America.

SEPTEMBER.

International air meet and Gordon Bennett Balloon Race at Chicago, Ill., in connection with A Century of Progress Exposition.

SEPT. 1-4.

Annual air meet of the Toronto (Ont.) Flying Club.

SEPT. 9.

Essex Aviation Display at Hillman's Aerodrome, Romford, England.

SEPT. 9.

American Legion air meet at Chicago, Ill.

SEPT. 30-OCT. 8.

Concentration of civilian aircraft in demonstration at College Park Airport, Md.

OCTOBER.

National air treasure hunt, beginning at St. Louis, Mo., and ending at New York, N. Y., under

the auspices of the U. S. Amateur Air Pilots Association. OCT. 3-7.

Air cruise of private planes from Washington, D. C., to New York, N. Y., in connection with the national charity air pageant for sportsmen pilots. OCT. 7.

National charity air pageant for sportsmen pilots, under the auspices of the Judson Health Center, the Emergency Exchange Association, the Junior League Chapters, the United States Amateur Air Pilots Association and the Sportsman Pilot Association of America, at Roosevelt Field, Mineola, L. I., N. Y. OCT. 7-8.

German air sport exhibition at Hanover, Germany. NOV.

Second International Egyptian Aviation Meeting at Cairo, Egypt, under the auspices of the Aero Club of Egypt. DEC. 18-24.

. Digest of Recent Events .

British Air Force Gives Flying Display

A squadron of Fury single-seater interceptor fighters tied through their evolutions tied together, and Bulldog fighters staged a low-flying attack on a convoy as two of the features at the Royal Air Force Fourteenth Display at Hendon air-drome, England. In spite of a downpour of rain, about 200 airplanes went through the flying program as it had been planned. JUNE 24.

British Commercial Craft Exhibit Flying Ability

Representatives of military and civil aviation in more than sixty countries were guests of the Society of British Aircraft Constructors at its second flying display and exhibition at Hendon air-drome, England. Airplanes of twenty-four types were flown in demonstration flights, and twenty-two other planes were displayed on the ground. JUNE 26.

Mattern Is Rescued in Siberian Wilderness

After about fifteen days of being lost in northern Siberia, James J. Mattern was rescued by native fishermen, who took him to their village. It was not until July 5, however, that the flier was able to send a telegram to the outside world that he was safe at Anadyr, about eleven miles from the village to which he had first been taken. According to later messages, his plane, the Wasp-powered Lockheed *Century of Progress*, had been forced down from lack of oil, which had become stiff from the cold, about fourteen hours after leaving Khabarovsk. When the Eskimos found him, he had had to abandon his plane, which was wrecked, and to walk to the river where he was found. JUNE 29.

Roscoe Turner Sets Cross-Country Record

A westbound transcontinental record of 11 hours 30 minutes was established by Col. Roscoe Turner, flying a Wasp-powered Wedell-Williams plane in the Bendix Trophy race from New York, N. Y., to Los Angeles, California. He shortened the previous westbound transcontinental record, also made by him, by 1 hour 3 minutes. The end of the race coincided with the opening events of the National Air Races. JUNE 29.

Junior Altitude Record Set by Young Flier

An altitude record of 16,371 feet, which was later recognized officially, was set above Floyd Bennett Airport, Brooklyn, N. Y., by Alfred K. Hall, Jr., aged 17. The flight was made in a Bird biplane. JULY 2.

Army Flier Wins French Air Race

Jean Langlois, Army pilot, and his mechanic, Burtin, placed first in a twelve-hour race for distance over a closed circuit at Angers, France. Their Farman plane covered a distance of 256.3 kilometers at an average speed of 206 kilometers per hour. JULY 2.

Small Plane Speed Marks Exceeded at Air Races

Average speeds of 237.4 miles per hour and 180.47 miles per hour were made by John Livingston and Jack Wright, respectively, in a Cessna, powered with a Warner engine, and a Monocoupe, also Warner-powered. Livingston's speed unofficially broke the record for planes with engines of less than 500-cubic-inch displacement, and Wright unofficially exceeded the speed record for two-seater planes of less than 1,000 pounds. The events took place on the closing day of the American Air Races at Chicago, Ill. JULY 5.

Boyd and Lyon Return from Haiti

Ending a one-stop flight from Port au Prince, Haiti, Capt. Errol Boyd and Robert Lyon landed at Washington, D. C. The flight was made in the rebuilt Bellanca monoplane, *Columbia*, powered with a Wright Whirlwind, in which they made a non-stop flight from New York, N. Y., to Haiti June 11-13. The return trip was made in about twenty-three hours' flying time. JULY 5-6.

Airplanes of "Macon" in Flying Maneuvers

At the successful conclusion of the *Macon's* first all-night training cruise, the group of airplanes which is to use the airship as a flying hangar practiced hooking on to the dirigible at Lakehurst, N. J., for the first time in flight. JULY 7.

Amelia Earhart Sets New Women's Record

The eastbound transcontinental speed record for women, established by Mrs. Amelia Earhart Putnam last year, was broken by her in a flight from Los Angeles, Calif., to Newark, N. J., in 17 hours 7½ minutes. The flight which established the new mark was made in her Wasp-powered Lockheed Vega monoplane. JULY 8.

Veteran Pilot Wins King's Cup Race

The oldest pilot in the contest, and designer of airplanes since 1908, Capt. Geoffrey de Havilland, flying a de Havilland Leopard Moth of his own design, powered with a Gipsy Major engine, won first place in the race for the King's Cup, starting and finishing at Hatfield Air-drome, England. Second and third places

in the competition over an 823-mile course were won, respectively, by Flight Lieut. E. C. T. Edwards in a Pobjoy-powered Comper Swift and A. J. Styran in a Leopard Moth. JULY 8.

Mattern Rescue Party Arrives in Nome

Headed by William Alexander, a party of fliers from Floyd Bennett Field, Brooklyn, N. Y., which had left their home airport June 30 for Alaska in a Bellanca monoplane to search for James Mattern before word had been received of his rescue, reached Nome. After hearing that he was safe in Siberia, they were planning to cooperate in his transportation to New York. JULY 10.

Gliding Contest Takes Place at Elmira

Stanley Smith won the Evans Trophy as the new American soaring champion in the Fourth Annual National Soaring Contest at Elmira, N. Y. The University of Michigan team was awarded the Fairchild Trophy for the group with the largest amount of flying time. The Halter Trophy was presented to Joseph Funk as the pilot of the two-place glider making the best record. First-place winners included the following: Spot landings, Floyd Sweet; endurance, Emerson Mehlhose and Robert F. Carey; altitude and distance, R. C. du Pont and Stanley Smith; Robert J. Eaton Memorial for altitude, Mr. du Pont, and duration for sailplane from airplane tow, all being released at the same altitude, Jack O'Meara, whose flight was under the sponsorship of AERO DIGEST. JULY 10-23.

Ellsworths Sail for Antarctic Expedition

Mr. and Mrs. Lincoln Ellsworth sailed from San Francisco aboard the liner, *Lurline*, en route to New Zealand. The *Wyatt Earp*, Ellsworth's ship, is expected to leave New Zealand late in the fall for the Antarctic, where he is planning a flight of exploration with Bernt Balchen in a Wasp-powered Northrop Delta across the continent lying between the Ross and Wedell seas. The trip direct to New Zealand was embarked upon after plans for a voyage to Norway had been abandoned. JULY 15.

Lithuanian Fliers Cross the Atlantic

Their fuel exhausted after a non-stop flight from Brooklyn, N. Y., to Germany, Capt. Stephen Darius and Stanley Girenas, who were en route to Kaunas, in their native Lithuania, crashed and were killed near Soldin, Germany, only a few hours from their goal. Their plane, the remodeled Bel-

lanca, *Lituanica*, powered with a Wright Whirlwind, left Floyd Bennett Airport at about 6:24 a. m., July 15, and is believed to have crashed at about 1 a. m. two days later. JULY 17.

Italian Planes Make 7,000-Mile Flight in Formation

Under the leadership of General Italo Balbo, the Italian Air Minister, twenty-four Savoia-Marchetti S.55X seaplanes, powered with Isotta Fraschini Asso engines, ended a 7,000-mile flight from Orbello, Italy, to Amsterdam, Holland; Londonderry, Ireland; Reykjavik, Iceland; Cartwright, Labrador; Shediac, New Brunswick; Montreal, Quebec; Chicago, Ill., the goal of the entire trip, and New York, N. Y., on the homeward flight. The flight began from Orbello July 1, reaching Chicago July 14 and arriving at New York five days later. JULY 19.

Australian Fliers on 'Round-World Trip

C. T. P. Ulm, pilot, and R. G. Taylor and G. U. Allan, co-pilots, arrived in London, England, on a 'round-the-world flight which started at Sydney, Australia, June 21. They plan to fly non-stop from Ireland to New York and to make a flight from San Francisco to Australia. The trip is being flown in a Fokker monoplane, *Faith in Australia*, almost entirely built in Australia and powered with three Wright engines. JULY 21.

Finnish Aviator Nears Close of 'Round-World Flight

Finland's good-will flier, Capt. Vaino Bremer, flew to New York, N. Y., from Washington, D. C., as one of the final steps in his air-water trip around the world. Leaving Finland May 11, Captain Bremer, a member of the Finnish Aviation Corps, flew in an all-metal 80-horsepower Junkers low-wing monoplane across Europe to India, China and Japan. Refused permission by the Soviet Government to fly through Russia, he sailed from Tokio to San Francisco and flew thence across the United States and to Montreal before visiting Washington. He sailed from New York for England, where he was to resume his flight to Finland. JULY 22.

Wiley Post Circles World, Solo, in Record-Breaking Time

Flying solo in his refinished Wasp-powered Lockheed, *Winnie Mae*, Wiley Post made a new 'round-the-world speed record, breaking the former record, made by him and Harold Gatty in the *Winnie Mae* in 1931. The flight began July 15 at Floyd Bennett Field, Brooklyn, N. Y., ending there 7 days 18 hours and 49 minutes later. JULY 22.

(Continued on following page)

Lindberghs Start Airline Survey

With a survey of a possible air route to Europe from North America via Greenland and Iceland as their object, Col. and Mrs. Charles A. Lindbergh flew in their Cyclone-powered Lockheed Sirius seaplane from College Point, N. Y., to South Warner, Me., where they were forced down by fog on July 9. After stopping at North Haven, Me., they flew on to Halifax, Nova Scotia, July 11. They continued on their flight, which is being made in connection with the Pan American Airways survey

expedition, to St. Johns, Newfoundland (July 12) and Cartwright, Labrador (July 14), where they were delayed considerably by fog. A week later they took off from Cartwright, and after more delay from fog reached Godthaab, Greenland, JULY 22.

Mollisons Fly Across Atlantic to Connecticut

A non-stop transoceanic flight from Pendine Sands, Wales, to Stratford, Conn., was made by Capt. James A. Mollison and Mrs. Amy Johnson Mollison in about 39 hours. The flight, which

ended in a crack-up while landing at the airport, was made in a twin-engined de Havilland Dragon Moth, *Seafarer*, which was wrecked in the crash. The following day the two fliers were flown to New York, their original destination. The plane was the second to fly across the Atlantic non-stop to the United States, and Mrs. Mollison was the first woman to do so in an airplane. JULY 22-23.

Italian Planes Fly to Shediac and Shoal Harbor

The fleet of Italian planes un-

der the command of General Italo Balbo flew from Floyd Bennett Field, Brooklyn, N. Y., to Shediac, New Brunswick, and the following day to Shoal Harbor, Newfoundland. From the latter place they prepared to hop off for Ireland. Two planes were forced down on the way to Shediac but later rejoined the fleet, and one was forced to land en route to Shoal Harbor. The flight from New York to Shediac, a distance of 650 miles, was made in about 5 hours 54 minutes, and the fleet flew from Shediac to Shoal Harbor 500 miles, in four hours.

JULY 25-26.

Flight of Balbo's Fleet from Italy to the United States and Return

HEADING the greatest mass flight in history, General Italo Balbo led the twenty-four airplanes under his command in a great formation expedition from Orbetello, Italy, to Chicago, Ill., between July 1 and July 15. Traveling as a peacetime armada of good will, the Savoia Marchetti S.55X seaplanes covered the distance of 6,100 miles in a flying time of 47 hours and 52 minutes, their Isotta Fraschini 880-horsepower Asso engines, two of which power each plane, sending them the entire distance without mishap. Only one accident, at Amsterdam, Holland, occurred, when an airplane upset while landing, leaving twenty-four out of the original twenty-five ships to carry on the flight. An auxiliary airplane had trailed the rest of the planes for the purpose of filling in any gap that might occur.

One of the most dangerous parts of the journey lay across the Alps, where clouds hemmed in the fliers, who were forced to fly by instrument alone. The route extended across Switzerland and Germany to Holland, the 870-mile distance being covered in 6 hours 21 minutes.

Leaving Amsterdam the next day, the flight proceeded without incident to Londonderry, North Ireland, a 630-mile journey which was flown in 6 hours 12 minutes. After a two-day delay at Londonderry because of unfavorable weather, the airplanes were flown in 6 hours 19 minutes to Reykjavik, Iceland, a 930-mile distance over water.

A week's delay because of unfavorable weather was followed by the longest and most dangerous hop, 1,500 miles to Cartwright, Labrador, covered in 12 hours 28 minutes. Cartwright was left the following day, and the fleet proceeded to Shediac, New Brunswick, a distance of 800 miles, in 5 hours 47 minutes.

The next hop, of 500 miles to Montreal, took place the day afterwards with a time consumed of 3 hours 54 minutes. Chicago, the goal of the flight, was arrived at July 15 after an 870-mile trip covered in 6 hours 51 minutes.

On July 19 the air armada flew in about seven hours from Chicago to New

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says **ART GOEBEL**

... Famous flier has used Johnson's Wax on his plane for several years. He gives his experience in the following interesting letter.

"While in New York recently, at Roosevelt Field, I stopped at your Approved Waxing Station. One of the attendants there asked me what I thought of Airplane waxing and when I told him I had been doing it for several years, he said you would be interested in knowing about it — which explains this letter.

- I have a two-year-old Lockheed Vega and it looks like a brand new job. My original reason for polishing the ship with Johnson's Wax was to get a few more miles per hour out of it, which the waxing actually gives.

- But aside from that, it has kept the finish on my Lockheed Vega in "factory" condition. The ship is painted white and would stain very quickly if it was not protected from mud, grease, etc.

- I am 100% for waxing, and if you can use my recommendation to any advantage you may do so."

Very truly yours, **ART GOEBEL**

LOOK FOR THIS SIGN. It signifies an authorized Johnson Waxing Station. Have a corner of a wing waxed and see what a tremendous difference it makes. Send in coupon for generous free sample.

DEALERS: Airports, bangars, schools interested in hearing about dealer opportunities, write S. C. Johnson & Son, Inc., Racine, Wis., for full details, samples, etc.



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York, N. Y., as the first step on their homeward journey. They took off from Floyd Bennett Airport, Brooklyn, N. Y., July 25, reaching Shediac about six hours later. On July 26 the fleet arrived at Shoal Harbor, Newfoundland, after a four-hour flight.

Ninety-six men who had been trained under the command of General Aldo Pellegrini, himself a participant in the flight, made the trans-Atlantic journey under General Balbo, who had led a similar, but smaller, expedition across the South Atlantic in 1931. Preparations had been under way for over a year for the 1933 flight, and meteorological stations and supply and landing bases along the route contributed not a little to the success of the enterprise.

Additional information, photographic illustrations and drawings of the Savoia-Marchetti seaplanes used on the flight appear on pages 14, 48, 56 and 57 of this issue.

Wiley Post's Solo Flight

AROUND the world in an airplane in a record-breaking flight for the second time was the accomplishment of Wiley Post last month. Although he already held the around-the-world speed record jointly with Harold Gatty since their flight of 1931, when they established a mark of 8 days, 15 hours, 51 minutes, Post took off, solo, July 15 in the same plane, the Wasp-powered Lockheed Vega, *Winnie Mae*, from Floyd Bennett Field, Brooklyn, N. Y. At about midnight, July 22, he landed at the field at the end of an around-the-world flight of 7 days, 18 hours, 49 minutes. The entire flight covered a distance of approximately 15,474 miles.



Acme photo

Wiley Post and General Balbo

Unaccompanied except for a Sperry Automatic Airplane Pilot of the type described in the June issue of AERO DIGEST, Post flew direct to Berlin, reaching it in 25 hours 45 minutes. By this flight he set a record for point-to-point navigation and established a distance mark for solo non-stop flying, 3,900 miles. After refueling at Berlin, he took off for Novosibirsk, Siberia, but was forced to land at Koenigsberg, East Prussia, 338 miles from Berlin, 4½ hours later because of weather conditions. Leaving Koenigsberg about twelve hours afterwards, he flew in 5 hours 35 minutes to Moscow, Russia, a distance of 670 miles, and landed unexpectedly because of breakage of a rubber connection between the oil pump and the engine. Almost three hours later he was in the air again, flying to Novosibirsk, which he reached in 13 hours 15 minutes. En route he became lost while his automatic pilot was temporarily out of commission, and bad weather delayed him.

Half way around the world soon after the close of the third day of his flight, Post rested for 15½ hours at Irkutsk, Siberia, at the end of a 900-mile hop from Novosibirsk, made in 6 hours 33 minutes. Flying from Irkutsk, he was forced down after 7 hours 32 minutes at Rukhlovo, Siberia, by weather conditions which caused him to postpone a take-off for about nine hours. He continued on to Khabarovsk, Siberia, 640 miles away, in 4 hours, 20 minutes.

Anxious to make time, Post took off from Khabarovsk after a rest of only about two hours. He passed over Nome, Alaska, attempting to reach Fairbanks, Alaska, but lost his way for seven hours before coming to a landing at Flat, Alaska, 360 miles from his goal, after a total of 22 hours 32 minutes from Khabarovsk. Further delay was caused by the necessity of installing a new propeller and making other repairs after the plane nosed over in landing. Proceeding to Fairbanks in 3 hours 14 minutes, he rested there for about seven hours before taking off for Edmonton, Alberta. He reached that city 9 hours 22 minutes later, and about 1½ hours afterwards left on the last hop of the flight to New York. He arrived after a non-stop 2,000-mile flight in 13 hours 18 minutes.

B/J and Condor Headquarters

A NEWS ITEM in the July issue of AERO DIGEST stated that the New York offices of B/J Aircraft Corp. and of the Condor Corp. had been moved to 1775 Broadway, where the headquarters of their parent company, North American Aviation, Inc., is located. The North American company has announced that this information is incorrect, that the headquarters of the Condor Corp. are in Jersey City, N. J., and that B/J Aircraft Corp. of Baltimore, Md., has no New York office.

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Johnson Heads United Holding Group

PHILIP G. JOHNSON was elected president of United Aircraft & Transport Corp. at a meeting of the board of directors July 12. Mr. Johnson succeeds Frederick B. Rentschler, who becomes vice-chairman of the Board, a new office recently created by the directors. Mr. Rentschler has been president of United Aircraft & Transport Corporation since its inception and will continue his active leadership in all policy and general administrative matters. Mr. Johnson will take over the executive direction of operations.

Mr. Johnson started with the Boeing Airplane Co. as a draftsman. He rose through the positions of production manager, superintendent, vice president and general manager to the presidency of the company in 1926. In 1927 Mr. Johnson became president of Boeing Air Transport, which was the nucleus of a nationwide network, and later of Pacific Air Transport, Varney Air Lines, and National Air Transport, all grouped now as United Air Lines.

When United Aircraft & Transport Corp., a holding concern, controlling companies manufacturing and operating airplanes, was formed, Mr. Johnson was elected a vice-president. United Aircraft & Transport Corp. subsidiaries include the Boeing, Sikorsky, Stearman and Chance Vought companies; Pratt & Whitney Aircraft Co., Hamilton Standard Propeller Co. and United Air Lines. There is also an export unit, a school, the Boeing School of Aeronautics, and airport interests at Hartford, Conn., and Los Angeles, Calif.

General Takes Over B/J Corporation

E. R. BREECH, chairman of the board of directors of North American Aviation, Inc., announced last month the completion of the first of the steps which he plans to take toward consolidating the various related activities of the subsidiaries of North American Aviation, Inc. The consolidation announced is one whereby B/J Aircraft Corp. becomes an integral part of the General Aviation Manufacturing Corp. The latter company was acquired as a wholly owned subsidiary of North American Aviation as a result of the recent exchange of North American Aviation stock for certain assets of General Aviation Corp.

J. M. Schoonmaker, Jr., remains as president of General Aviation, and Temple N. Joyce will become executive vice president and general manager. Mr. Joyce was one of the organizers of the Berliner-Joyce Aircraft Corp., the predecessor of the B/J Aircraft Corp. F. S. Hubbard, who has been associated with Mr. Joyce in the B/J Aircraft Corp., will be assistant general manager. L. R. Beardslee is secretary of the corporation, and John C. Felli is treasurer.

TRADE LITERATURE

Stinson Airplane Publication

• THE FIRST number of "Stinson Plane News" was published recently by the Stinson Aircraft Corp. Featuring the new Stinson Reliant, the four-page paper includes a 1½-page three-view scale drawing, five photographs and a detailed description of the ship.

Other sections include discussions of the Stinson trimotor Model U air liner, the Stinson Air Cab and Lycoming engines. An interesting map shows the 1300-mile route covered by a Stinson four-passenger plane in one working day, at a cost per passenger \$45.43 less by plane than by rail. (22)

Transcontinental Airline Travel

• AN INTERESTINGLY illustrated pamphlet entitled "Across the Skyways" has been issued by United Air Lines for prospective passengers and is carried on planes of the company to acquaint passengers with equipment used and operating practices. Several pages are devoted to a description of the new Boeing transports now in use, including enumeration of performance data, features of design and provisions for the comfort and safety of passengers. The type and duties of personnel, including pilots, stewardesses, ground forces and maintenance staffs also are covered, together with a section on weather observations and reports.

Another part of the book includes a discussion of night flying, with particular attention paid to explanations of radio beacon systems. Mention also is made of the air mail and express services. While the pamphlet abounds in interesting photographs, particularly attractive air views are found in the section concerned with the various routes of United Air Lines. (23)

Portable Electric Systems

• TROLLEY DUCT systems illustrated in a booklet published by Bulldog Electric Products Co. show a development in electrical distribution. Suitable for poly-phase, single-phase and direct current, the systems, as described in the folder, provide a flexible source for electricity at every point in the manufacturing as-

sembly line. The tool glides forward as the product advances, or another tool can be connected in a brief time. Dispensing with plug sockets and extension cords, the Trol-e-Duct systems are described as being applicable not only to manufacturing operations but also to testing of electric products and repair work anywhere that electric power and light must be portable and instantly available. (24)

Tool Lapping Machine

• PORTER-CABLE Type D-4 tungsten-carbide-tool lapping machine is discussed in a leaflet issued by The Porter-Cable Machine Co. The machine is described as providing the lapped tool with an edge which compares favorably with that obtained through the use of the more expensive diamond dust as an abrasive. A cast-iron disc is used as an abrasive in the Porter-Cable device, with a wooden disc for a semi-polished finish. (25)

Folder Features Aircraft

• ITEMS of interest to aeronautics appear in the May-June issue of "Schrader-town News," published by A. Schrader's Sons, Inc. These include a page of pictures on which are photographs of Naval airplanes alighting on the aircraft carrier, *Saratoga*; a plane that is designed to fly backwards and an English model seaplane that has a speed of about ten knots. (26)

Chart of Nickel Alloy Steels

• THE INTERNATIONAL Nickel Co., Inc., has issued a circular chart, showing at a glance the nickel alloy steel compositions and treatments required to develop yield points up to 175,000 pounds per square inch in section sizes varying from one to twelve inches. The figures given are based on numerous tests and may be used as a general guide to the selection of steels for bars, shafting and forgings of single shape.

Copies of the chart will be sent, on request, to metallurgists, engineers, steel salesmen, purchasing agents and executives of the machinery and allied industries. (27)

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• THERE is no other magazine, anywhere, like THE SPORTSMAN PILOT. It is devoted exclusively to the sport side of aviation, to private pilots, aviation country clubs, sport aircraft and kindred subjects. From the point of beauty, THE SPORTSMAN PILOT ranks among the most attractive magazines in the country. Its style is original, interesting, educational and entertaining. Published under the same roof with AERO DIGEST, it may be obtained on a combination subscription rate — one year of THE SPORTSMAN PILOT and one year of AERO DIGEST for only \$5; the full rate is \$3 a year each.

2 NEW editorial features of AERO DIGEST recommend this magazine above all others in the aviation field to aeronautical engineers and aircraft dealers and distributors.

¶ As a result of the recent purchase of "Aviation Engineering" magazine and the addition of a new and larger engineering department to AERO DIGEST, this complete magazine now provides the engineering fraternity with a concentration of the published sources of engineering information. ¶ The new series of articles on Aircraft Marketing is the most intelligent and thought-provoking treatise on sell-

ing aircraft ever to be presented to aviation's sales personnel. Dealers, distributors, sales managers and other aircraft executives everywhere proclaim this series to be the most helpful they have ever read. ¶ You can read these features, and many more, in every issue of AERO DIGEST. The magazine, by covering all phases of aeronautics in so complete a fashion, makes it possible for you to secure all the news and developments of the industry without spending your time and money on other aeronautical publications. The subscription price is \$3 a year; two years for \$5.



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FOREIGN NEWS IN BRIEF

Australia

The Larkin Aircraft Supply Co. has designed and built a new airplane, the company stating that this type of machine is specially designed for Australian conditions, that it is suitable for the Darwin-Singapore section of the proposed England-Australia mail service, and that a similar machine has flown 50,000 miles in Australia.

The company has submitted to the Postmaster-General an offer to inaugurate at any early date an unsubsidized weekly mail service between Darwin and Koepang. No guaranteed minimum loading is sought. The K. L. M. would exchange air mails to and from Europe.

THE MONOPLANE *Tasman*, formerly the A. N. A. Ltd., *Southern Star*, has inaugurated a twice-weekly service from Melbourne to Launceston, Tasmania.

Canada

J. D. M. Gray of the Toronto Flying Club left Toronto early last month to sail for England, where he was to pick up express parcels to fly them as the first commercial air express to Toronto via the northern route, stopping at Iceland and Greenland. The trip has been in preparation for nearly two years, and gasoline has been stored in readiness along the route. The plane is a Fairchild cabin ship and was given to Gray by the northern aerial mining prospector, Jack Hammell, who is largely responsible for the use of airplanes in the Canadian Far North.

AMERICAN and Canadian fliers and planes will participate in the Canadian Air Pageant, to be held at St. Hubert Airport, Montreal, Quebec, August 19 and 20. An international stunting contest will be one of the features of the pageant, and American parachute jumpers and aerobatic fliers are expected to give exhibitions. John Runger in a demonstration of the standing loop and standing spin also will take part in the air show, it is anticipated. Three Siskin fighters and three Atlas fighters will give an exhibition of military flying, and a Canadian military ground demonstration also will be held. Among the races will be a thirty-mile handicap race for women, and the men's events will include a free-for-all handicap and contests classified according to engine cubic-inch displacement. The air pageant will be held under the auspices of The Montreal Light Aeroplane Club, Inc.

TORONTO Flying Club members flew a total of forty-nine hours on June 18, in their third annual "dawn-to-dusk"

flight, commemorating the trans-Atlantic flight of Alcock and Brown fourteen years ago.

Training facilities of the club include aerobatics and instrument flying. The annual air meet will be held September 9.

PRIVATE PILOTS numbered 361 and commercial pilots totaled 437, according to Canadian license figures as of May 31. Forty-eight private and 295 commercial aircraft were registered, and 100 airport licenses were in effect.

FORMAL UNION of The Saint John (New Brunswick) Flying Club and The Flying Sportsman's Aero Club took place recently. The united clubs have an active flying membership of about eighty and will operate at least three planes this summer. New officers are: Robert Irwin, president; Ralph Gale, vice president; Harold Daye, secretary, and John Moore, treasurer. In addition to a directorate of fifteen, a flying committee of three has been appointed.

THE CANADIAN GOVERNMENT, if supplied with necessary cooperation from the municipality, will develop the Saint John, New Brunswick, airport and make an all-way field of it, it was announced recently. This project would be carried on under the federal unemployment scheme. Landscaping has already been accomplished at the field by a group of unemployed men.

China

Passenger service is scheduled to begin this month between Canton and Shanghai via coast ports. Air mail service has already been opened between the cities by China National Aviation Corp.

Egypt

A touring contest over a set course of approximately ninety miles and a speed race over a distance of approximately 230 miles will be features of the Second International Egyptian Aviation Meeting at Cairo, Egypt, December 18-24. The Oases Trophy will be awarded to the competitor gaining the highest total of points in these two contests. Cash prizes will be equivalent to over £1500.

The competitions are open to all classes of land aircraft and amphibians having a certificate of airworthiness issued by the country of their origin and bearing the registration marking of that country. The closing date for entries will be October 15. The Representative of the Aero Club of Egypt, Heston Airport, Hounslow, Middlesex, England, is in charge of information regarding the meet.

France

One company has been formed for the conduct of all subsidized French air transportation services. Five companies were merged to form the new organization, which will carry on operations under a fifteen-year contract. From June 1 to December 31, 1933, the total maximum subsidy will be 94,500,000 francs, and for 1934 it will be 150,000,000. A reduction of 5,000,000 francs will be made each year until the permanent total maximum subsidy, 135,000,000, is reached in 1937. The five companies affected are Air Orient, Aeropostale, Farman Lines, Air Union and International Air Navigation Co.

AS PART of an administrative reorganization of the French Ministry of Air, the meteorological office will be returned under the control of the Ministry and will be attached either to the civil aeronautics section or to the general technical section. The latter section will be confined to research for new model designs and to the manufacture of new models and prototypes, of which the number developed will be reduced. All manufacturing of aircraft in series will be carried on by the section of military aerial material.

Germany

The steamship *Westfalen*, which has been conducting successful tests in the South Atlantic Ocean as a floating service station for trans-Atlantic mail airplanes, has finished her preliminary work and is to undergo minor changes. In September or October the ship is expected to return from Germany and to undergo final experiments in mid-ocean before entering active service as a station in a regular transoceanic airline. This line, alternating with the *Graf Zeppelin*, will at first give four-day service from Berlin to Rio de Janeiro, Brazil, it was announced.

THE LUFTSCHIFFBAU ZEPPELIN of Germany will build a hangar at Rio de Janeiro, Brazil, with the aid of a Brazilian Government loan. Following the construction of the hangar, it was reported, twenty Zeppelin trips will be made annually. The hangar will be located at Santa Cruz, about sixteen miles from Rio de Janeiro.

JOINT AIR SERVICE between Berlin and Rome, Italy, has been opened by the Deutsche Luft Hansa and the Società Aerea Mediterranea. Each company flies one plane daily in each direction, giving a nine-hour service.

(Continued on following page)

SCINTILLA AIRCRAFT MAGNETOS

ALL magnetos, generally speaking, do the same thing—deliver ignition sparks timed with each cylinder cycle. Some do it with barely enough accuracy and energy to keep the engine roughly firing; others do it fairly well.

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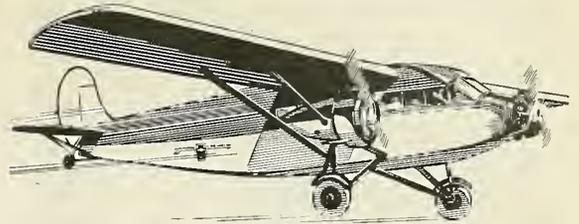
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(Continued from preceding page)

Great Britain

A powerful air-cooled heavy-oil aeronautical engine has been developed by the Bristol Aeroplane Co. Known as the "Phoenix," the engine in outward appearance closely resembles the Jupiter engines. Like them, and their successors in the Pegasus and Mercury classes, it has nine cylinders arranged about a central crankcase.

Normal horsepower is 350, developed with the crankshaft turning at 1,900 r.p.m., with a maximum of 380 horsepower. The mixture of air and heavy-oil spray in the cylinders is ignited by compression rising nearly to 1,000 pounds to the square inch; the compression ratio is 14 to 1. The complete engine weighs 980 pounds. Fuel is consumed at the rate of 2/5 pound of heavy oil per horsepower-hour.

TORPEDO-CARRYING biplanes, powered by Rolls-Royce 825- to 930-horsepower Buzzard engines are among recent products of the Blackburn Aeroplane & Motor Co., Ltd., and Vickers (Aviation) Ltd.

The new Blackburn plane, named provisionally the MI/30A, has an all-metal fuselage of small cross-sectional area. The water radiators are placed under the roots of the lower wing.

An important detail of the Vickers MI/30 is the landing gear, each side of which consists of a simple tripod of streamlined struts and telescopic shock-absorbing legs. Wheel brakes and a tail wheel are fitted, both details offering advantages in maneuvering about the restricted area available on the flying deck of an aircraft carrier.

THE VICKERS Viastra cabin monoplane referred to in the January AERO DIGEST as being built for the Prince of Wales is now in use. It has a wing span of 70 feet, a length of 45 feet 6 inches, accommodates eight passengers and has 70 cubic feet of baggage space. Powered

with two Bristol Pegasus engines of 605-55 horsepower, it has a cruising range of 700 miles at 130 miles per hour, which with the addition of an extra fuel tank is increased to 1,050 miles.

The Prince of Wales has acquired another new plane, a twin-engined Dragon biplane. It is the sixth de Havilland airplane to be owned by the Prince and is specially equipped to meet his requirements. Presumably it will be employed when the load to be carried and the distance to be flown do not demand the greater speed and roominess of his Vickers Viastra monoplane.

The Dragon, finished in the scarlet and blue of the Brigade of Guards, is equipped to carry six people in adjustable red leather armchair seats. A comprehensive instrument board provides the passengers with information about the speed and altitude of the plane in flight. Safety glass is used in the windows, and the walls are packed with soundproof padding. Radio receiving and transmitting apparatus form part of the navigation equipment, which also includes, at the Prince's special request, the most up-to-date blind-flying instruments. The plane is of the standard Dragon type.

MULTI-ENGINED "Singapore III" biplane flying boats have been developed by Short Bros., Ltd. These planes, powered each with four Kestrel water-cooled engines, will be improved versions of the Singapore II, which in the last three years has gone through extensive trials under service conditions. The four engines are mounted in tandem arrangement in two nacelles located between the wings on either side of, but above, the hull. Employing horsepower of over 2,000, the Singapore III is designed to be at least thirty miles an hour faster than any military flying boat at present in the British service.

Features of the design include engine mountings on a single strut and the all-metal hull, which is constructed entirely of alclad. The plane carries normally a

crew of six—two pilots, three gunners and a wireless operator. Sleeping accommodation and a separate kitchen are provided in the fuselage.

Four machine gun emplacements carry the defensive armament. One gun-ring is mounted in the nose of the hull, two are staggered, one on either side of the fuselage aft of the wings, and the fourth is located in the tail behind the rudders.

Its predecessor, the short Singapore II, in official trials, with full load on board, attained a speed of 134.15 m.p.h. at a height of 6,500 feet.

Fully loaded, the Singapore II weighs 27,752 pounds. Its wing span is 90 feet, it is 64 feet in length and 24 feet, 3 inches, in height. It climbs to 6,500 feet in 11½ minutes, attaining 10,000 feet in twenty-two minutes. Its service ceiling of 12,200 feet is reached in thirty-five minutes from take-off. Cruising range exceeds 1,000 miles.

IMPERIAL AIRWAYS recently announced the inauguration of air cruises with a special five-day cruise by one of its air liners from Egypt to England via Bengazi, Malta, Rome, Lyons and Paris.

Night flying between Tokyo and Fukuoka will open this month, it is planned. Carrying mail only at first, the ships to be used are Nakajima type P1 mail planes, powered with Nakajima Jupiter engines, manufactured by the Nakajima Aircraft Works at Otamachi.

A LONG-DISTANCE flight between Berlin and Tokio is planned by a Japanese aviator, K. Kawano, it was announced recently. He will start from Berlin this month, and flying through India and China, expects to arrive at Tokio fifteen days later.

Tests made recently by the Post Office Department show that air mail is delivered forty minutes after its arrival at the Mexico City central civil airport, which is about two miles from the main post office. The Department uses express motor trucks and side-car motorcycles which have the right of way over all other traffic.

MEXICAN AVIATION CO. (Pan American Airways) has announced that it has instructed its pilots on the Mexico City-Merida route to fly over the ancient Maya ruins of Uxmal as often as weather conditions permit. The company has also ordered its pilots, as often as visibility and weather conditions permit, to fly over the pyramids in the San Juan Teotihuacan zone outside Mexico City, on its Mexico City-Tampico route.



Vickers Viastra metal monoplane owned by the Prince of Wales

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Without Benefit of Clergy

(Continued from page 19)

taken by the F. A. I. to enable the below signed to maintain their good standing in the F. A. I., and that a committee be appointed to investigate the entire matter and suggest a solution." And there the matter rests, as it were, on the knees of the gods; so an end to carping and on with the show.

And a fine show it was, though it necessarily fell below the standard of National Air Races of former years in the one particular that there was no participation by the Army, Navy or Marine Corps pilots, except for a visit by the Pursuit Group from Selfridge Field on the opening day. Naturally the Fighting Services can't take part in all air meets around the country; so if they give their highly valued support to the National Air Races, they've done all for commercial racing that any of us has a right to expect. Still, whenever it is possible without conflict with Service requirements, I hope that our citizens around the country may be given an opportunity to see at air meets at least a squadron of one of the Services in their impressive maneuvers. It's a good idea to show the taxpayer something that he is getting for his money, besides speeches.

The show each day clicked with the precision of a well managed vaudeville performance, which is what it really was; there was never a hitch, never a wait. From Ben Griffin diving to salute the flag, right through to the human comets, Clem Sohn and Wayne Wagner, diving out of planes a mile high and waiting to pull the rip-cords of their parachutes until they saw the whites of the customers' eyes, it was a fast and thrilling air show. There was Roy Hunt in deadstick acrobatics, Art Davis balloon-bursting; E. M. (Mattie) Laird and Marcellus King in aerobatics; mimic warfare with anti-aircraft battery firing at a bomber, and Roy Hunt and Art Davis in a dog fight, and Geo. T. Burrell, Jr., the pilot of the "bomber," a tri-motored Ford, pretending that he was hit and going through a series of the most blood-curdling stunts I have ever seen a Ford put through. Then there was Dick Granere in crazy flying, Charles Abel in glider aerobatics, an old-time Lincoln Beachey pusher flown by Jack Bonnell, Frank Faulkner in autogiro exhibitions, Bob Moore of Kansas City in "Goofus," about the world's funniest airplane, and Betty Lund, who flies higher and smoother than ever. And finally the old maestro, Johnny Livingston himself, doing aerobatics at five miles a minute in a Howard racer or in his new Cessna, and then the Comets diving from the sky while strong women turned pale and fair men reached for their smelling salts. It was a swell show, and thanks to the wonderful co-

operation of pilots, managers and announcers, it was run off better than any I've watched before. Events dovetailed perfectly between arrivals and departures of airliners.

As for the races, their interest for the crowds was considerably lessened by the unavoidable necessity of starting from a runway, fifteen seconds apart, instead of in line with a racehorse start. Thus even with the most hectic attempts to keep track of all positions, which Jack Story, Jim Ewing and I all worked at together like three amiable brothers, though I did the actual shouting, it was simply impossible to give the crowd the thrill that the racehorse start would have given them. Next year, when the new part of the Municipal Airport probably will be in condition to use (so Airport Manager John Casey hopes), it will be possible to run off speed events as they really should be run.

However, allowing for the disadvantage of a start that the crowds couldn't see, the races were satisfactory.

The bold outcasts who braved the N. A. A.'s displeasure by flying in these races included, in addition to those I have mentioned, Harvey Mummert, Marcellus King, Helen MacCloskey, Lloyd Butz, Clarence McArthur, Clyde Pangborn, Harold Neumann, Walter Franklin, Art Carnahan, James McKenna, E. M. Laird, Doug. Davis, Roger Don Rae, L. G. Larson, Eldon Cessna and A. J. LaPointe. Their standing in the races is reported elsewhere, but their standing as good sportsmen who refused to be intimidated by the old Grand Exalted Snadragon and his gang, is rated ace high.

And, behold, brothers, when tidings of all these things were brought unto High Priest Hi-Ram-Bing-Ham in the land of Yesmen, that is called Hollywood, he rent his garments and covered himself with sackcloth and cigar ashes, and went up into a mountain, for to ponder and to pray. And it came to pass that he smote the rock with the rod that was in his hand; and the rod turned into a serpent, and bit him in the nether garments, and spake, saying, "Nertz to thee, Brother Bing-Ham."

The Air Races at Los Angeles

(Continued from page 21)

Fame. George Hague of California, flying the little 4-cylinder Menasco-powered Keith Special, and Roy Minor of Hollywood in "Benny" Howard's six-cylinder Menasco-powered low-wing racer, were two of the most consistent prize winners of the entire races, although it was their first appearance as racing pilots in the national meet.

Hague flew and placed in the money in every free-for-all race from the daily 375 cubic-inch events up to the unlimited

Thompson trophy classic. Minor won the grand sweepstakes award for the 550 cubic-inch class. S. J. Wittman of Oshkosh, Wis., veteran racing pilot, won the sweepstakes in the 375 cubic-inch class.

The only major speed record to fall this year was the East-to-West transcontinental mark. Roscoe Turner, flying his Wedell-Williams racer powered with a supercharged Wasp Senior engine, lowered the New York-to-Los Angeles time to 11 hours and 30 minutes, winning \$4,050 in prize money and the \$1,000 bonus for breaking the record.

"Old Reliable" Jimmy Wedell, who took second last year in the Bendix transcontinental dash, the Shell straight-away speed dash and the Thompson trophy race, repeated his performance this year. Wedell had completed a new racing plane for the national meet, but it showed up a few "bugs" on the way to New York for the start of the Bendix. Rather than take a chance on the plane before it was thoroughly proven, Wedell returned to Patterson, La., climbed in the cockpit of his last year's Wasp Junior-powered racer, and flew it again to second place in every major event.

Although finishing first at a speed of 241.03 m.p.h., in the Thompson trophy race, Turner was disqualified for cutting pylon No. 3 on the first lap. Turner circled the pylon on his second time around, but the rules require a contestant to return and circle a pylon on the same lap it is missed. Turner's disqualification automatically moved Wedell up to first place. Turner has appealed the decision to the National Aeronautic Association.

Event 3, Women's Shell Speed Dash, was not run and prize money of \$1,425 was paid on the basis of standing in the Aerol Trophy Race.

Business Needs Air Transport

(Continued from page 26)

prime concern is to reduce government expenditure.

In order to make clear to Mr. Douglas the importance of continuing government aid within reason to air transport it is merely necessary to point again to the splendid record of the American airlines in recent years. Few businesses anywhere in the world have made the gains that are to be observed in the last two years on the domestic airlines. These gains are not profits out of a government dole. American aeronautics has no apology to offer to the assistance which it has had from the Federal government.

It has provided the all-essential framework upon which the American air transport structure has been built. Any future Federal policy toward air mail which is based alone upon economy is apt to be a short-sighted view. The speed in communication which is provided in an adequate air mail service is an essential aid to industrial recovery.



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(Continued from page 24)

Don't Overlook the Ladies

In your search you will not be considerate enough to neglect the ladies who today hold 4.5% of the private pilots' licenses in the U. S. Of those who fly for sport alone, more than half own their own planes. Where to look for your lady prospects some of you salesmen will know a lot more about than your home-loving scribe. But even though many of the present women fliers follow mundane occupations, as secretaries, cashiers, librarians, teachers, trained nurses (there is one lunch counter waitress), it is safe to say that your search will lead you all the way from the Junior League to the highest trapeze in the circus tent. By the way, the wives of pilots sometimes own their own planes.

Uses for Airplanes Are Legion

You will make yourself fully acquainted with the markets for airplanes where the primary use is other than for transportation of individual owners. Airplanes are bought for advertising and promotional purposes, for traveling display rooms and for the delivery of light or perishable merchandise; for interplant and interoffice communication and transportation of personnel, payrolls, products and equipment; for real estate exploitation; for use at resorts, carnivals and fairs; for rapid field surveys; for inspection of property; for the delivery of newspapers and for news photo services; for the transportation of sound and movie equipment; for conveying negotiable paper; for communication with remote sections, mining, fur and trading outposts; for inspection of herds; for locating schools of fish and reporting catches; for regular service in the oil, mining, lumber, construction and power industries; for a list of miscellaneous and ingenious uses too numerous to mention here.

You will cultivate governmental and state officials and keep them informed of the valuable service rendered by planes in the transportation of officials, in patrolling forests and waterways and of other

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important activities not falling within the domain of military, naval and coast guard aviation. You will acquaint municipal authorities with the effective uses of airplanes in police, inspection, city planning and other services.

Some sources will produce a better yield than others, but you must first deal in prospects in the raw—then the finished product. It should be enlightening to explore class C and D prospects where competition is not so keen, and more profitable than confining all your efforts to class A and B prospects who are receiving most of the attention from your competitors. Experience will show how many class A, B, C and D prospects must be investigated to insure the sale of one plane. And don't be discouraged about your prospect-finding methods when the fellow you never thought to look up drops in and buys a plane.

Always you are looking for the man or woman whose face lights up when you begin talking airplanes. Even when you are discussing plane economics with a business executive, showing him how a plane may save fifty working days in a year of executive travel, your man must be the right kind or the result will be "no sale." Shrewd salesmen first seek a sympathetic air-minded contact on the staff of an organization prospect so that

a friend at court may be on hand when the question comes before the board.

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Don't waste too much time on the prejudiced mind but seek and cultivate the men and women who are capable of responding with normal enthusiasm to the greatest privilege to which modern man has fallen heir—the ability to fly to a chosen destination.

Digest, Foreign Articles

(Continued from page 50)

Propeller Design

Airscrew Design, D. L. H. Williams. Royal Aeronautical Society Journal, Vol. 37, No. 270, June, 1933, pp. 479-495 and (discussion) 495-508, 16 figs.

A BRIEF REVIEW of the present position in the design of propellers is given, dealing only with such parts as are of interest from the engineering viewpoint. The author discusses the principal features of air flow and makes some remarks on design theories. He takes up design methods and problems and the procedure in solving them. He gives practical solutions for the various cases of extreme propeller performance and concludes with some general notes on variable-pitch propellers. In referring to future developments, he believes that as the results of full-scale wind tunnels become more widely appreciated, there will be a general cleaning up of propeller design theory.

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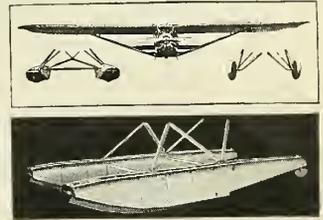
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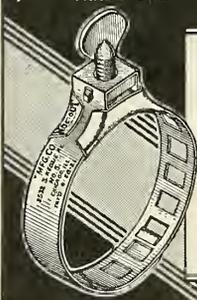
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1. Aircraft operators, get the details of Pioneer's new Straightflight compass. (Page 37)
2. Literature of the Ryan School of Aeronautics, San Diego, Calif., tells about their various flying and ground courses, special equipment, tuition, etc. (Page 11)
3. Richfield's booklet tells where Richfield aviation gasoline can be bought. (Page 10)
4. B. G. Spark Plug literature describes the plugs that were installed in 94% of the winning planes at the 1933 National Air Races. (Page 6)
5. Stinson invites prospective plane purchasers to write for the latest issue of Stinson Plane News, which describes the new Reliant. (Page 9)
6. Airports and aircraft operators, obtain Kendall's literature concerning their "racing" oil. (Page 7)
7. Low prices still prevail at the Dallas School. Write for literature describing the various courses, prices, etc. (Page 8)
8. The new Switlik Parachute booklet describes the popular chair type chute for cabin planes. (Page 63)
9. The Spartan School has a catalog describing the many advantages of their training, plus low prices. (Page 41)
10. Texaco describes its various aviation products—gasoline, oil, grease, asphalt products. (Page 12)
11. Detailed specifications of the new Boeing 247 transport are available to airline executives. (Page 33)
12. The Boeing School Bulletin tells about flying, ground and administrative courses beginning with the next enrollment. (Page 39)
13. Private fliers and commercial operators—write for literature describing the high speed Beechcraft. (Page 69)
14. Penn School's literature outlines their several excellent courses, for which prices are still reduced. (Page 65)
15. Aircraft manufacturers, engineers, etc., are invited to write for P. & W.'s literature describing Wasp and Hornet engines. (Back Cover)
16. Air travelers will find T. W. A.'s timetable a handy reference to have available. (Page 61)
17. Bellanca's literature discusses, for airline and commercial operators, the "Airbus" transport plane and freighter. (Page 31)
18. The use of Socony-Vacuum fuels and lubricants on Post's 'round-the-world flight is described for transport operators and airport managers. (Page 4)
19. Berry Bros.' literature describes for manufacturers, repair stations, plane operators and owners, their line of paints, varnishes, enamels and lacquer. (Page 70)
20. Karl Ort, dealer in all sorts of aircraft bargains, has a catalog for those who are ready to buy aeronautical supplies. Enclose 10c with order. (Page 67)
21. Tri-State College offers literature outlining its two-year course in aeronautical engineering. (Page 74)
22. Roosevelt Field Aviation School offers training in all branches of aviation. Prospective students are invited to write for details. (Page 70)
23. Engine manufacturers, repair depots, aircraft operators, etc., are invited to write for literature describing Thompson valves. (Third Cover)
24. The Air Line Pilots Association has on file the names of a number of unemployed experienced airline pilots. Aircraft operators take note! (Page 71)
25. Engineers, manufacturers, aircraft operators—be sure to obtain literature on Hamilton Standard's controllable pitch props. (Page 49)
26. Private owners and commercial operators, Waco's Cabin model is fully described for you in a new catalog. (Page 35)
27. Plane owners and operators, schools, distributors, private owners—the Johnson's Wax literature tells how to preserve your plane's finish and improve its performance. (Page 61)
28. The Lincoln School, Lincoln, Nebraska, has a booklet outlining its various pilots' and mechanics' courses, together with costs and other information. (Page 71)
29. Pacific Airmotive invites users of aircraft, and ground station personnel, to write for the folder describing Westport aircraft and ground radios. (Page 40)
30. A deferred payment plan for purchasing aeronautical books. (Page 80)
31. Stanavo, used by General Balbo, is distributed world-wide. Licensed pilots are invited to write for the Stanavo Pilot's Handbook. (Page 1)
32. The Sperry Gyroscope Company describes for operators and pilots the robot pilot used by Wiley Post on the "Winnie Mae." (Page 3)
33. Parks Air College's booklet, "Skyward Ho!" describes the various flying and ground courses, prices, etc. (Page 5)
34. The newest Fairchild 22, powered with a Gipsy engine, is described in detail for dealers and potential plane owners. (Page 69)
35. Goodyear offers to operators, engineers, manufacturers and pilots literature describing the Airwheel. (Page 29)
36. Airline operators will be interested in details of the new twin engine high speed 12- to 18-passenger Douglas transport (Second Cover)

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FOR SALE: J-5 or J-6-7 late type Taperwing Waco. Wonderful condition throughout. Gas tanks in undercarriage V's for inverted flying. This ship must be seen to be appreciated and is priced to sell. E. A. Forner, Jackson, Michigan.

FOR SALE: OX Robin; good condition, located Minnesota. AERO DIGEST, Box 1580.

BEST KINNER FLEET in Western New York: Metal prop, air wheels, instruments, high gloss finished fuselage; 150 hours on motor since major overhaul; controls completely refurbished; ship never stunted; sweetest Fleet you ever flew. \$1,150; will consider open or closed three-place job. Commercial Airport, Sales & Brokerage, Coldwater, New York.

FAIRCHILD 21: 100 h.p. Kinner; total time ship and engine, 96 hours. New condition. Price \$1,500. Ralph Wilson, Suffolk Airport, Westhampton Beach, New York.

VOUGHT CORSAIR for sale: Less than 100 hours since complete factory overhaul. Wasp motor, landing lights and extra instruments. AERO DIGEST, Box 1582.

FOR SALE: Pitcairn Autogiro, 2-place, 125 h.p. Kinner motor, Heywood starter; used only 68 actual hours. Special finish, like new. Will consider trade for J-5 Standard with or without motor. Write J. Frank Wilson, Boiling Springs, Penna.

MONOCOUCPE: Lambert; 150 hours. Hamilton metal prop; turn-bank; rate climb; Waltham clock. Excellent condition. Fire Equipment Sales Co., Birmingham, Alabama.

WACO CABIN: 1932 model; Continental 120 h.p.; excellent condition. Extras, including steel propeller, leather upholstery. Radio and special paint job. Finished in white fuselage and red wings, and trimmed in blue. Real bargain. Hugh C. Robbins, Waco Distributors, Cleveland Airport, Cleveland, Ohio.

CLASSIFIED ADVERTISEMENTS

10c. PER WORD; \$2.50 MINIMUM. PAYABLE IN ADVANCE.

Used Planes and Engines

WACO 10: Siemens 123 h.p.; perfect condition; just relicensed. Spare motor, incomplete. Irvin parachute. \$800. C. T. Burgess, Ocean Bluff, Massachusetts.

RYAN SPEEDSTER: 3-place open; Axelson 150 h.p. radial motor. Waco 90, 3-place open, OX-powered. Ships licensed 1934. Perfect condition. Lynn S. Probst, American Legion Airport, Mill Hall, Penna.

WACO 10: New covering; complete instruments; Scintilla magneto; Miller overhead; air generator and lights; Hamilton steel prop. Just relicensed. \$550. Wallace Quicksall Jr., 90 Madison Avenue, Mt. Holly, New Jersey.

FOR SALE: Fleet, Kinner B-5 125 h.p. Air wheels, tail wheel, steel propeller, Heywood air starter and many other extras. This is a wonderful ship in very excellent condition and must be seen to be appreciated. Time payment to responsible buyers. P. O. Box 250, Jackson, Mich.

FLYABOUT: Factory demonstrator like new; Szekely motor just factory rebuilt. A bargain at \$725. Licensed Junior, less than 100 hours, A-1 condition. \$610. New Eaglerock, rebuilt Hisso motor, \$1,150. Hisso Eaglerock like new, just factory rebuilt, \$640. Bargain in used planes, all makes. List your used ship with us. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

CURTISS ROBIN, OX-5: Excellent condition, oleo landing gear, 30 x 5 tires, complete set of instruments; \$425. Hite Aircraft Co., Rising Sun Airport, Philadelphia, Pennsylvania.

TRAVEL AIR: J-6.5; Model E-4000. Three-places; recently reconditioned throughout and motor overhauled. Standard Steel prop, navigation lights, plenty of instruments for blind flying, brakes, etc. Finished international orange and black. Sell or trade. Central Air Service, Battle Creek, Mich.

FOR SALE: OX-5 Waco 10, new condition, less than 200 hours; \$500. OX-5 Command-Aire Trainer, excellent condition; \$495. Little-Greiner Flying Service, Springfield, Ohio.

5 "B" WASPS: 500 hours, 184 since overhaul; \$400. Two "B" Wasps, shielded, 500 hours, 120 since overhaul; \$650. Engine accessories, propellers, ship and motor brokerage. Wanted: Good Moth, cheap. Aircraft Salvage and Sales Company, 48-03 Ditmars Blvd., Astoria, L. I., New York.

NEW STANDARD D2S, \$2,200. Ryan B-5, \$2,500. Both planes and engines just rebuilt and in new condition. Unusually attractive colors. Standard Air Service, Inc., Teterboro Airport, Hushrouck Heights, New Jersey.

CABIN J6-9 hi-motor monoplane; time, 100 hours; licensed. Top speed, 160; cruising 135; landing, 50. Climbs 1,600 feet per minute. Flies one engine, fully loaded. Take-off 4 seconds. Excellent for club or advertising. Daniel La Lee, 624 Brady Street, Dearborn, Michigan.

CURTISS-WRIGHT, JR.: Licensed. Ship and motor in perfect condition. George Myers, H and Luzerne Streets, Philadelphia, Pennsylvania.

CURTISS-WRIGHT AIR SEDAN: Four-places; Challenger engine; 150 hours; detachable motor mount; is also approved with Wright 7-cylinder. Ship to be sold as is with damaged right wing and right side landing gear, less propeller. Extras, lights and flares. Bargain. Hugh C. Robbins, Cleveland Airport, Cleveland, Ohio.

FOR SALE: The following ships at bargain prices: Velie 65 h.p. two-place Monoprep, cabin ship; J-6 165 h.p. Curtiss Robin land or seaplane, like new; OX-5 Travel Air, with air wheels; Kinner B-5 125 h.p. Fleet, many extras; J-5 Kinner B-5 Waco land or seaplane; brand new 45 h.p. Szekely Bull Bull Pup; J-5 Taperwing Waco; J-6 300 h.p. Ryan B-5. All ships NC licensed, excellent condition, and priced to sell. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

AMERICAN EAGLE: Kinner; air wheels; perfect condition; price, \$700. Address J. S. Munro, 2971 Linden Street, Detroit, Michigan.

FOR SALE: J-6 300 Cessna. Real bargain. Tex LaGrone, Municipal Airport, Kansas City, Mo. souri.

WACO CABIN: 210 Continental; new last September, only 60 hours total time; landing lights, flares, radio, never cracked or damaged, condition like new throughout, \$4,350 cash. Also Klemm 85 LeBlond, manufactured 1930, speed ring and other extras, excellent condition, \$700 cash. Somerset Hills Airport, Basking Ridge, New Jersey.

CURTISS ROBIN: J-6 175 Wright; starter, Standard steel prop, etc. Engine completely modernized, ship recently recovered and special paint. Also, J-6.5 engine same as new. Used Pioneer bank and turn indicator, \$25. Real prices on plane and engine. Trades considered. Aero-Marine Service, Russell's Point, Ohio.

WACO F-2: 165 Continental, complete set of instruments, wing-root fairing, radio shielded. Total time, 210 hours; 10 hours since major overhaul at Continental factory. Privately flown, like new ship. Price, \$2,850. Silk seatpack chute, never jumped, like new, to purchaser. Laura A. Schmidt, 630 East Town Street, Columbus, Ohio.

BARGAINS, AMPHIBIONS: 3-place Savoia, 5-place Loening, Curtiss Flying Boat; Edo floats, \$50, Henderson motor with prop., Robin fuselage. Take trades, engine, camera, gun, kicker, anything. Chris Walton, 2330 Morgan, Tampa, Fla.

FOR SALE: Waco F Warner. Steel propeller, speed ring, air starter. Total time, 180 hours. Perfect condition. Licensed until November, 1933. \$1,700. Box 239, Newtown, Connecticut.

ROBIN OX, 161 HOURS: Wings recovered, otherwise refinished and overhauled; interior and exterior like new; never cracked. Air speed, compass, duals. 254 Niagara Falls Boulevard, Buffalo, New York.

WRIGHT J-5 EAGLEROCK: All modern equipment; in good condition. Have been asking \$1,200. Make an offer. H. R. Brown, 85 Adams Street, Rochester, New York.

FOR SALE: Ryan M-2, completely recovered and reconditioned. Hisso motor, just overhauled; Hamilton steel prop. NC license. N. Amick, Carson, North Dakota.

LATE STINSON JR.: Motor just refined and major overhauled at Lycoming factory. Perfect condition. Will sell or trade on late open Waco. AERO DIGEST, Box 1584.

FOR SALE: Stinson Wasp six-place monoplane; plane and engine completely overhauled; K-3 Fairchild Aerial Camera; Butler Steel Hangar. Woods Bros. Construction Co., Lincoln, Nebraska.

STINSON JUNIOR: Kinner K-5; three-place. Total ship time, 375 hours. Just licensed, 15 hours since major overhaul, including recovering with Flightex, Berryloid dope. Total motor time, 20 hours. Equipped with radio shielding, steel propeller, Heywood starter, radio receiver, safety glass throughout, navigation lights; very good flying; \$995. Gene Searle, Wayne County Airport, Romulus, Michigan.

FOR SALE: Lambert R-266, 90 h.p. motor. Perfect condition. Ten hours total time. Wood or steel propeller. J-4-B Wright motor with small amount of time since major overhaul. Central Air Service, Battle Creek, Michigan.

BIRD KINNER: in excellent shape, never cracked up. Steel propeller. Air wheels and brakes. Motor has 20 hours since major overhaul. Licensed. \$1,600. F. Gerhino, 12139 Kilbourne, Detroit, Mich.

FOR SALE: 1931 Cabin Waco, four-places, new Jacobs engine, steel propeller, \$2,350. 1932 Waco A, two-place, side-by-side, \$2,500. Curtiss Challenger Robin, very good condition, \$850. The above equipment is in excellent shape and will be sold to make room for new Waco line. Inspection invited. Wings Corporation of Philadelphia, P. O. Blue Bell, Pennsylvania.

LICENSED DOUGLAS mail plane; Liberty motor. Electric starter; brakes; blind flying instruments; flares; landing lights; two cockpits; 1,000 pound cargo pit. Deliver anywhere for expenses. \$1,450. Box 132, Bellefonte, Pennsylvania.

WONDERFUL BARGAINS: Used planes. Bellanca Pacemaker; Lycoming Stinson; Warner Waco; Velie Monocoupe; Warner Cessna; Challenger Robin. Wanted Wasp Travel Air. Rapid Air Lines Corp., Omaha, Nebraska.

NEW STANDARD Sport biplane: Kinner motor, air wheels, dual instruments and dual controls; fine condition. Relicensed until July, 1934. Privately owned and ready to fly away. \$750. R. P. Haupt, 870 E. Market Street, Akron, Ohio. Hemlock 4109.

SIEMENS WACO: Ship and engine completely overhauled; recovered, licensed until April, 1934. Equipped with speed ring, air wheels, brakes, steel propeller, \$1,050. Air Activities Airport, West Chicago, Illinois.

STINSON S: Wings recovered, fuselage refinished; Lycoming major overhauled 20 hours ago. Blind and night flying equipment, ship used by airline as blind flying trainer, \$1,500 cash. Gus Leazer, Candler Field, Atlanta, Georgia.

J-5 ENGINE, J-5 Waco, J-5 Travel Air, J-5 Avoplane Standard; two Russell lohe parachutes. Two Hisso wood propellers, \$10 each. Milton Hersberger, Put-in-Bay, Ohio.

MONOCOUCO LAMBERT: Small number hours; speed ring; air wheels, brakes, steel prop, fabric and ship in excellent shape. Motor overhauled 10 hours ago. Color, black and silver. \$1,300 cash. Kinner Fleet, front exhausts; ship and fabric fine condition; air wheels, wood prop, \$1,000 cash. A. H. Fooks, Rehoboth, Delaware.

FOR SALE: Aerona 2-place with E-113 motor. Just recovered and motor overhauled. Licensed to May 15, 1934. Price, \$700. Irvin parachute included if taken at once. P. O. Box 51, Waukesha, Wisconsin.

SPARTAN BIPLANE: Axelson 150 h.p. motor. Ship just recovered and motor overhauled. Lycoming motor just overhauled, with reconditioned propeller. Make offers. New Lycoming parts at large discount. Ozark Airways, Inc., Springfield, Missouri.

USED AIRPLANES, ALL MAKES: If you want a real good airplane or parts at wholesale, get in touch with "Pioneer" Aircraft Supply Co., Airport, Syracuse, New York.

FAIRCHILD 22 Cirrus Hi-Drive; perfect shape. 180 hours, never damaged; \$1,500. NC licensed. Compass, etc. Harold Potholm, 699 Broadway Terrace, Hartford, Connecticut.

GEE BEE: K-5 Kinner, side-by-side biplane. Total time, 40 hours. New covering. Cruising 100. Climb, first minute, 1,000. Brakes, tail wheel, extras. Like new. \$1,000. R. F. Walton, New Canaan, Connecticut.

WACO F: \$1,400. Avian Cirrus, \$650. Waco J-5 Taperwing, \$1,800. Moth Gipsy, \$900. Challenger OX-5, \$475. J-5 Travel Air, \$1,400. Moller Walton, New Canaan, Connecticut.

FOR SALE: Aeromarine Klemm low-wing monoplane; LeBlond 65. NC licensed until June 15, 1934. Excellent ship instruction, students, etc. Easy to fly; stable, low landing speed. Will not spin. Equipment includes duals, air wheels, navigation lights, extra wing tank, oleos. Price, \$500. Laurence Reynolds, Allenhurst, New Jersey.

FOR SALE: Aerona, Kinner Bird, OX Bird, Fleet, Great Lakes, Lockheeds, New Standard Trainer, Sikorsky S-38, Stinson Jr., Challenger Travel Air, J-6 Ryan, J-6-300 Laird, Bellanca, Loening Commuter, Aircraft Sales Co., Hangar D., Roosevelt Field, Mineola, New York.

AMPHIBION: Savoia-Marchetti, three-places; one year old; factory cost, \$7,000; always hangared at factory; 90 Kinner, all instruments, air starter, duals; about 60 hours; \$2,000. No trades. Harry Freedman, 270 Madison Avenue, New York, N. Y.

PITCAIRN AUTOGIRO: Two places; Kinner 125 h.p. motor. Metal propeller; Heywood starter; completely equipped. Factory checked; excellent condition; licensed. 130 hours on ship, 145 on motor. Price, \$2,250. Pitcairn Aeronautical Corp., Pitcairn Field, Willow Grove, Pennsylvania.

STINSON SR.: J-6 330 h.p., model SM1F. Like new; in A-1 condition throughout. Motor recently overhauled and up to date. Ship has A.T.C. for pontoons. Priced to sell, or will trade. Central Air Service, Battle Creek, Michigan.

CLASSIFIED ADVERTISEMENTS

10c. PER WORD; \$2.50 MINIMUM. PAYABLE IN ADVANCE.

Used Planes and Engines

FOR SALE: Curtiss Fledgling, Challenger motor, perfect condition. O. J. Whitney, Inc., Glenn Curtiss Airport, North Beach, N. Y. Newtown, 9-0306.

FOR SALE OR TRADE: OX Robin, 145 hours total; compass; many extras; licensed to July, 1934. Prefer Bird or Waco. Cecil Matthews, 126 Chestnut St., Oneonta, New York.

\$1,500 COLD CASH will buy Stinson SM&A, Lycoming, 450 hours, never been crashed, just been relicensed, covering excellent. Demonstration, Burlington, Vermont. AERO DIGEST, Box 1591.

FOR SALE: N-B Trainer with Genet motor, cracked; can be repaired. Will sell complete \$100 cash, or will sell master units separate. R. J. Reel, Box 1519, Sanford, Florida.

J-5 STRAIGHT WING Waco, just relicensed; perfect throughout; 85 hours on motor, full of extras. \$1,350 in New York. Will deliver anywhere for expenses. AERO DIGEST, Box 1592.

CURTISS JR: Almost new, 80 hours; \$450. J. A. Simcock, 200 East Roosevelt Boulevard, Philadelphia, Pennsylvania.

OX-5 MOTORS: Just purchased from the Government. Guaranteed brand new and complete. Shipped privilege inspection. Reasonable price. Grand Marine Motor Co., 827 Whittier, Detroit, Michigan.

BEST OFFER takes Waco 9, identified and in good condition; always hangared. Also pair Model "C" Edo pontoons. Louis Seaburg, 29 Hess Street, Jamestown, New York.

FOR SALE: J-5 Lockheed, good condition, \$1,500. Wasp Flamingo, just factory overhauled, \$2,250. Both ships licensed to July, 1934. Iowa Airways Corporation, Fort Dodge, Iowa.

MONOCOUCPE: Velie engine; 15 hours since overhaul; wing recovered, entire ship repainted; new propeller, wheels and tires; extra instruments; total flying time, 100 hours. Price, \$650. T. B. Lucas, Hadley Field, New Brunswick, New Jersey.

CURTISS JUNIOR: Just recovered; wing ribs strengthened, motor overhauled, all control surface cables and hinges renewed. Licensed to May 1, 1934. Bargain, \$400. Fonda Aviation, Inc., Westfield Airport, Westfield, New Jersey.

WANTED to trade or sell at bargain: Loening amphibion, Wright 300. Less than 100 hours time. Consider Warner or Lambert Monocoupe, Waco F or similar job as trade in Allentown Aviation Corp., Allentown, Pennsylvania.

RYAN BROUGHAM: J-5, excellent condition, licensed; Ryan Speedster J6-5 biplane, in wonderful shape, used little. Must sell; make offer. C. Schneider, Hart, Michigan.

WACO 165 Continental Cabin: ring and wheel pants. Ten hours since motor major overhaul. Attractively priced. G. H. Jackson, care Modine Mfg. Co., Racine, Wisconsin.

MONOCOUCPE: Velie engine; no time since complete motor overhaul. Recovered, fabric like new. Many extras. Bargain, \$600. Fonda Aviation, Inc., Westfield, New Jersey. Telephone, Rahway 7-2037.

AVRO-AVIAN: Total time 131 hours. Ship is in perfect condition. Price \$625. No reasonable offer refused. AERO DIGEST, Box 1597.

Miscellaneous Services Opportunities, Offers, etc.

FOR SALE: Two GE 24" beacon lights, 5 years old. One stationary and one revolving, two speeds. Has assembly for course lighting, and automatic lamp changer. Stepdown transformer on revolving beacon. Also steel tower, 30 feet high, with platform around light. Total original cost, \$1,430; will sacrifice. Old National Bank, Evansville, Indiana.

AERIAL CAMERAS: Fairchild 5 x 7 U. S. Navy Model 14; equipped with long and short focus cones; magazine, two roll holders; Carl Zeiss f 4.5 lens in Fairchild cone shutters; complete outfit packed in original sturdy fibre trunk, excellent condition. Original cost, \$1,240. Specially priced at \$140 complete. M. & H. Sporting Goods Co., 512 Market Street, Philadelphia, Penna.

AERONAUTICAL EQUIPMENT: The best for the least, from propeller to cotter pin. You name it, we price it. Write now. Buse Company, A8, 683 East 138th Street, New York.

EXPERT REPAIR WORK, all types. Complete stock aircraft materials at sacrifice prices. Factory built Eaglerock parts. Department of Commerce Approved Repair Station. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

PIGMENTED DOPE: Diana Cream, Loening Yellow, Robin Yellow, Deep Orange, Robin Orange, Stinson Green, French Grey, Great Lakes Blue. \$1.25 per gallon. 5 gallons, \$6. Hite Aircraft Co., Rising Sun Airport, Philadelphia, Penna.

CYCLONE R-1750 MOTORS: We have four of these motors with very few hours on each. Price, \$250 each. Pratt & Whitney Wasp parts: Cylinders, \$10 each; new crankshafts, \$15 each. Rising Sun Motors, 857-67 East Luzerne Street, Philadelphia, Pennsylvania.

BRAND NEW K-5 Kinner motors; front exhaust, original crates, \$395. Used K-5's, \$125 up. OX's and OX's, \$55 up. Wright J6-5, \$395. J6-9, \$695. Hissos A's, \$135, ready to install. Kinner, J-5, OX, Hissos parts; new, 40 per cent; used, 70 per cent. Wanted: Lower wings for center section Eaglerock. Becker Flying Service, Buffalo, N. Y.

FOR QUICK SALE: Edo Floats complete; interchangeable on J6-5 Robin or Challenger Robin. In excellent condition. P. O. Box 250, Jackson, Mich.

BARGAINS IN LeBlond and Kinner parts. B-5 Kinner heads same as new, \$39. Magnetos, air-wheels, etc. Right lower wing for taper wing Waco. Union Airways, Inc., Bloomfield Avenue, Pine Brook, New Jersey.

PROPELLERS: Lowest prices in the country. Steelellers for Warner, J5 and J6. Brand new late production Hamilton wood props for Warner, Kinner, Wright Whirlwind, Wright Gipsy, Hissos, Ryan-Siemens, Anzani, American and English Cirrus, Curtiss Challenger, \$20 each. Have almost every brand for any motor. Central Air Service, Battle Creek, Michigan.

FOR SALE: Irving seat pack parachute, practically new; \$100. Hissos air starter and tank for Kinner, brand new, \$75. AERO DIGEST, Box 1590.

FOR SALE, WING PARTS: Ribs, spars, etc., for Waco 10, Travel Air, American Eagle, Eaglerock, Waco Cabin. New London Aircraft Co., New London, Ohio.

OX-5 PARTS NEW: 50 Z. carburetors; 50 magnetos, wires; 50 prop hubs. 15 sets exhaust pipes-50 hub pullers. 50 huh wrenches. All or parts. 638 Kimball St., Philadelphia, Pennsylvania.

DON'T BUY ANYTHING until you get Ort's 1933 Aviation Material Catalog. Prices are lower. Send one thin dime today. Karl Ort, 691 W. Poplar St., York, Pennsylvania.

AVIATORS WILLING to cooperate with me to advertise: I own the best aerial advertising device, just patented and tested. Will sell state rights. Write Picco Interstate Aerial Advertising, 509 Fifth Avenue, New York, N. Y.

Positions Wanted

EX-EDITOR aviation magazine, writer, artist, trained in advertising and publicity; university education, re-classified private pilot; 25; desires position with future in reliable transport or aircraft company. AERO DIGEST, Box 1573.

AIR LINE PILOT with over 3,800 certified day and night hours desires connection. Rated on all land ships, including S. A. T. (blind flying) rating. Over thousand hours on multi-motored, radio-equipped ships, flying on schedule. A & E mechanic's and radio tel. licenses. Experienced field manager and instructor. 36 years old, married, speaks Spanish. Sound proposition considered anywhere. AERO DIGEST, Box 1574.

PARKS AIR COLLEGE Mechanic graduate. 21, single, desires position in aviation for experience. Pay secondary. Reliable, good references, will go anywhere. W. Sandt, Pen Argyl, Pennsylvania.

EXPERIENCED ENGINEER: M. S. in Aeronautics, pilot, experienced ground instructor, will work for plane or flying time, plus small salary. Consider anything, anywhere. Work guaranteed. AERO DIGEST, Box 1578.

B. S. AERONAUTICAL ENGINEERING: Desires job in aeronautical industry. Willing to do anything for start. Go anywhere. Age 23, married. References. AERO DIGEST, Box 1575.

AIRLINE PILOT: with S.A.T.R. blind flying rating. Also radio and A. & E. licenses. Over 4,000 hours, day and night. College graduate. Best references. The pilot, 616 Commercial Street, Provincetown, Massachusetts.

GIRL L.C. PILOT desires position paying flying time. Am experienced in flying school office work, chute jumping, selling, passenger hopping, etc. Will go anywhere. References. AERO DIGEST, Box 1579.

TRANSPORT FLIER with Travel Air six-place cabin plane and sales ability, desires connection with a corporation as sales representative or pilot. Best references; go anywhere. AERO DIGEST, Box 1581.

TRANSPORT PILOT: Flying 14 years. Over 2,000 certified hours, including 800 hours airline. Qualified on tri-motored, bi-motored landplanes and flying boats. PPA Pilot, Box 102 B. F. Sta., Washington, D. C.

FOR EXPENSES: Transport pilot will fly for private owner or others. Good mechanic, open and closed ships. Single, 34. References. AERO DIGEST, Box 1585.

GROUND SCHOOL GRADUATE: 22, single, desires position in aviation for experience. Will work hard, go anywhere. Would like autogiro barnstorming. Best references; experienced in barnstorming. AERO DIGEST, Box 1595.

HOW ★ ★

TO COUNT THE WORDS IN YOUR CLASSIFIED AD

★ The rate is 10c a word, with a minimum charge of \$2.50. All classified advertisements are payable in advance. Count each word separately. For instance: "For Sale," two words. Initials or abbreviations also count as separate words. For example: "E. D. Howard, 1716 E. Parsons

Bldv., Detroit, Mich.," should be counted as nine words. Also, "AERO DIGEST, Box 1776," should be counted as four words. Hyphenated model numbers, such as J6-5, OX-5, etc., count only one word. Following is a typical advertisement: "FOR SALE: OX-5 Waco 90.

A-1 condition, just recovered, licensed until June 1934. Privately owned, always hangared, 410 hours total time. Price \$450. Write or wire Mr. R. U. Reddy, 6718 E. 178th Street, Cleveland, Ohio." The correct count is 36 words—or \$3.60.

Forms for classified advertisements in the SEPTEMBER issue close
AUGUST TWENTY-FOURTH

CLASSIFIED ADVERTISEMENTS

10c. PER WORD; \$2.50 MINIMUM. PAYABLE IN ADVANCE.

Miscellaneous Products & Equipment For Sale

OWNERS OF DAMAGED AND UNLICENSED aircraft: We recondition and prepare aircraft for license and store at no extra cost to you until sold. Becker Flying Service, Buffalo, New York.

RUN YOUR GASOLINE engines on crude oil, four to six cents per gallon. Device anyone can make. Blueprint and instructions, one dollar. National Motor Specialties, Box 873, Atlanta, Ga.

SINGLE YOUNG MAN from the country who is mechanically inclined, handy with woodworking tools and knowledge of motors, to work on aviation field. Exceptional opportunity to learn to re-build ships and will teach you to fly. No wages. Can get board and room for \$7.50 per week. Box 132, Bellefonte, Pennsylvania.

COMPETENT aircraft man seeks contact to develop profitable parts service, or build plane. Business experience, technical knowledge; skilled workman. Now operating active small shop. Highest type background. AERO DIGEST, Box 1587.

AIRPORT: Rent or Sale. 120 acres; 2½ city Flint. Office, gas station; ideal place for school. Rent reasonable. Mrs. Elizabeth Kelley, R. D. No. 1, Flint, Michigan.

PRIVATE PILOT: New York City; will pay for flying time, trip to and from Chicago. Full particulars to AERO DIGEST, Box 1594.

Parachutes For Sale

PARACHUTES: Approved type. Seat, hack, lap and chest; bought and sold; exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Ill. Established, 1909.

Wanted To Buy Or Trade

WANTED: Waco 9 with or without motor. Must be in good condition and priced reasonably. Also, one brand new Hammondsport OX-5 motor. C. Sanders, P. O. No. 3, Centerville, Tennessee.

INTERESTED IN Aristocrats and Monocoupes and Cessna; also Warner engines. Condition immaterial. Must be cheap. Edward Conklin, East Moriches, L. I., N. Y. Telephone 138.

WILL TRADE licensed OX-5 Travel Air for Travel Air Speedwing, or Waco Taperwing. Ship always hangered, never cracked, recovered last year. Millerized motor, 30 hours since complete overhaul. Will pay cash difference. A. D. Clayton, Nashville, Tenn. Box 479.

WANTED: Waco F-2, Continental 210. Must be in excellent condition, never cracked, and priced right. Will pay cash. AERO DIGEST, Box 1596.

WANTED: 4-place amphibion or flying boat. Also Challenger Robin or J-5 cabin ship. Consider ship less engine. Johnson Airways, 3100 Grand Route, St. John, New Orleans, Louisiana.

WANTED AT ONCE: Right wing for Stinson Lycopmg Model S. Must be licensable. Give information and lowest price. Write or wire Michigan Aero Motors, Jackson, Michigan.

WANTED: Upper and lower left wings for TP Swallow. Tred Avon Flying Service, Inc., Easton, Maryland.

WILL EXCHANGE choice orange and grapefruit grove with clear title for cabin or open plane. Must be in good condition and licensed. Box 235, Mission, Texas.

CASH for air-cooled planes up to 250 h.p. Any condition. Give complete details and price in first letter. AERO DIGEST, Box 1588.

WANTED: Fin, r. h. landing gear axle and brace strut, one center section strut, one wing strut, for Great Lakes 2T-1. Hite Aircraft Co., Rising Sun Airport, Philadelphia, Pennsylvania.

WANTED: Davis DK1. Wings, motor mount, cowling and Aerol struts, or any licensed ship requiring Kinner K-5. Frank Arndt, 2805 Clement Ave., Milwaukee, Wisconsin.

CASH FOR WACO F-2: Must never have been cracked up. State age, exact condition, and best cash price. Address AERO DIGEST, Box 1583.

FOR SALE, WINGS: Waco 10, Travel Air, American Eagle, Eaglerock, Waco Cabin. Prices \$30 and up. The New London Aircraft Co., New London, Ohio.

WANTED: Good performing airplane, by 1,000 hour transport pilot, for commercial proposition, on fifty-fifty basis. Let your idle ship work. AERO DIGEST, Box 1586.

WANTED: Amphibion or float-equipped plane. Must be good and licensed; will trade 26 foot or 17 foot speed boat, with or without motor. Tri-State Boat Mart, Hamilton, Indiana.

USED PARTS: Bought; sold. Wings, air wheels, motors. What have you? What do you need? Szekely drop forged steel replacement cylinders. Moller Walton, New Canaan, Connecticut.

SOLO TIME WANTED on light plane, at low cost, by solo pilot with 30 hours. Field must be vicinity New York City. AERO DIGEST, Box 1589.

CASH FOR WINGS: Great Lakes, Bird, Waco F or 10, Moth, or others. Any condition, fair price, quick action. Beebe Aircraft Service, Muskegon, Michigan.

WILL PAY CASH for modern air-cooled two-, three- or four-place open or closed airplane. May consider one needing repairs. Full particulars in first letter. AERO DIGEST, Box 1593.

WANTED: Aeronca parts, ship and engines. J. A. Simcock, 200 East Roosevelt Boulevard, Philadelphia, Pennsylvania.

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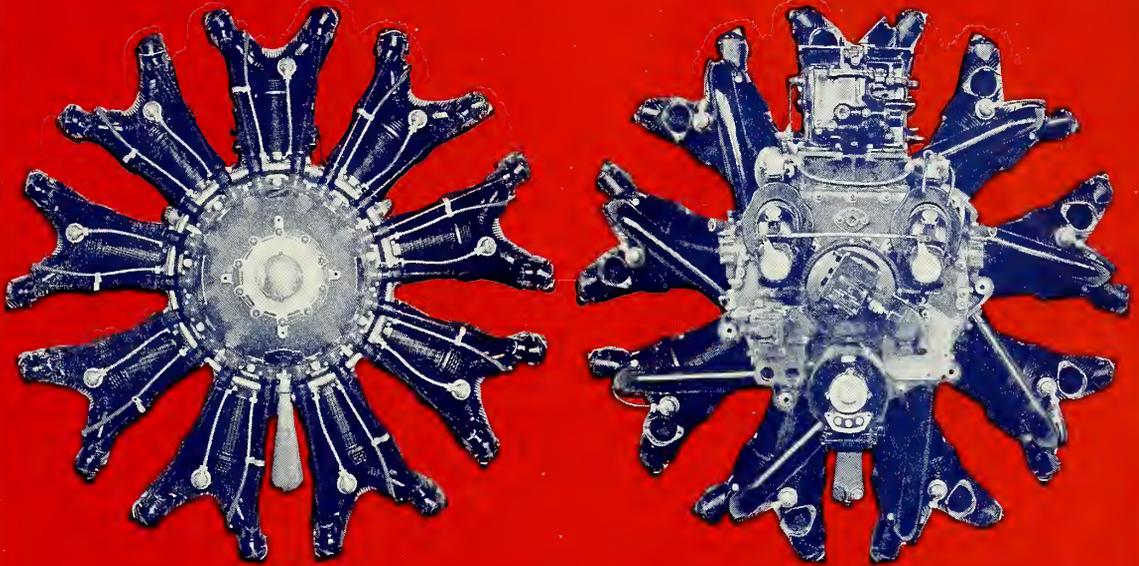
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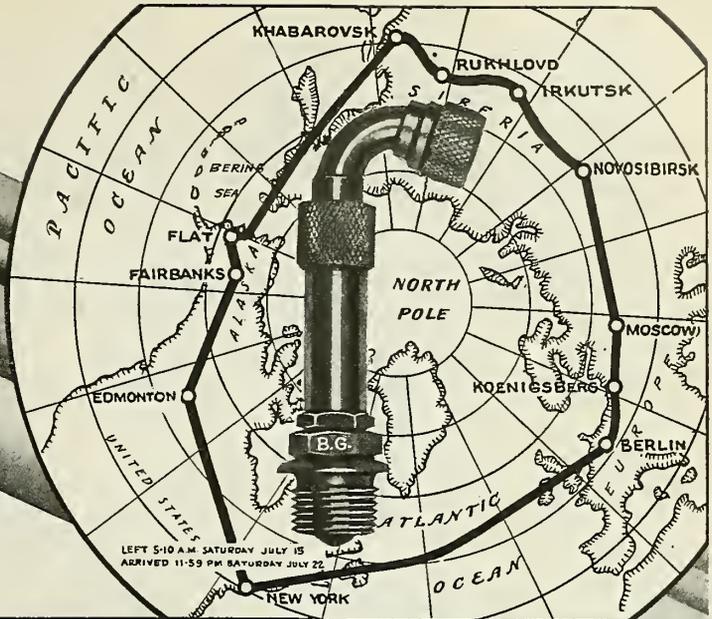
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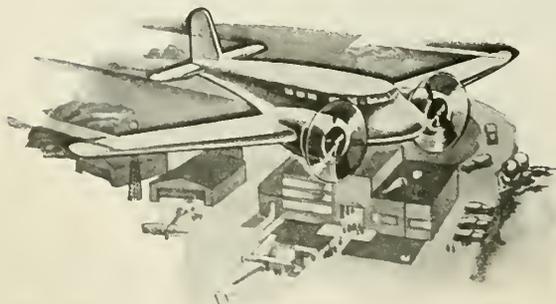
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Part of a formation flight of Great Lakes Trainers at the Ryan School of Aeronautics

Reorganization in Dept. of Commerce

and

A New Plan of Operation

● **REORGANIZATION** and a new plan of operation for the Air Regulation Service of the Aeronautics Branch, Department of Commerce, will reduce the Service's expenditures for the current fiscal year to a figure \$500,000 less than the amount spent in the preceding fiscal year.

The reduction in personnel of the Air Regulation Service incident to reorganization amounts to about fifteen per cent of the total number of persons employed and includes recent deaths and resignations. Employees in Washington and in the field service are being reduced in number from 200 to 170. The personnel cut represents only a small part of the general economy program, the major savings being brought about by changes in operation and administration.

Outstanding among these changes are: Permanent assignment of individual inspectors to forty-five cities and examination of license applicants at these places, with a consequent saving in travel expenses; consolidation of the two Inspection Districts based at New York City and Philadelphia into one district with headquarters at New York; discontinuance of the Department's maintenance base at Bolling Field, Washington, D. C., and complete segregation of airline inspection.

Heretofore aeronautical inspectors have traveled throughout their territories on itineraries which were made known in advance to all who might wish to contact them for inspections of aircraft, for examination and flight testing of pilot license applicants and for renewals of aircraft and airmen licenses. An inspector usually was at his regular headquarters only a few days a month, as most of his time was consumed in traveling from one airport to another and in visits of one to three days each at the various airports.

Under the new procedure, the Supervising Aeronautical Inspector in charge of an Inspection District will assign each inspector to a city within the district's territory. Applicants for licenses and renewals will be required to contact whichever inspector may most conveniently be reached, and if any traveling is necessary, this will be done for the most part by the applicant. As a rule, inspectors will make trips only for investigations of accidents or violations of regulations.

●
REX MARTIN

Assistant Director for Airways



As there are not enough inspectors to provide for headquarters at all important air centers, some will be assigned to make periodic visits away from their own headquarters. For example, an inspector stationed at Washington, D. C., will be scheduled to make one or two day visits each month in Richmond and Baltimore. Thus, his routine program will call for not more than four days a month away from his headquarters office, although, of course, he may be called upon at various times to travel to other places for special investigations.

Elimination of Solo Grade a Major Step

The abolishment of the solo grade of licensed pilot, announced on August 15 by Assistant Secretary of Commerce Ewing Y. Mitchell, is an important part of the new operating procedure of the Air Regulation Service. With inspectors conducting examinations only at their headquarters, qualification for a solo license would have required many pilots with ten hours of flying experience to make cross-country flights in order to reach inspectors for their tests. The solo grade, therefore, was discontinued, inasmuch as the test given for the grade is not of sufficient value to justify requiring a cross-country flight to be made at that stage of a pilot's career.

Requirements as to relicensing of repaired or rebuilt aircraft also have been broadened. Formerly an airplane which had been damaged extensively could not be flown again until the repair work had been inspected and approved by the Department. Hereafter, when the repair work has been checked and approved by a licensed mechanic, the airplane may be flown to the base of the nearest Depart-

ment of Commerce inspector for inspection, provided no passengers are carried until after the repair work has been approved and the craft relicensed.

The merger of two Inspection Districts reduces the number of these districts from nine to eight. The New York City and Philadelphia districts, with offices respectively at Roosevelt Field, L. I., N. Y., and Central Airport, Camden, N. J., have been combined, and it is planned to locate the office of this district at Floyd Bennett Field, New York's municipal airport.

The maintenance base at Bolling Field was responsible for periodic overhauls and repairs of all Department of Commerce aircraft. This work now will be done under contract in the field, and supervising aeronautical inspectors will be responsible for making certain that it is done economically. Fourteen mechanics formerly were employed at the Bolling Field base. In the recent past the force had been reduced to eleven by a policy of non-replacement of vacancies. Nine of these employees now will be separated from the service. Two will be retained and stationed at Washington Airport to care for Department planes operating in and out of Washington in the course of official business.

Fourteen Department of Commerce aircraft will be placed in dead storage in order to save their cost of operation, or because they will not be needed at the present time owing to the reduced traveling. They will be available for further service in the future to replace craft now in use which may be retired from service.

Airline Inspection, Etc., Segregated

A change effected chiefly in the interest of efficiency, but which also may result in incidental economies, is the complete segregation of airline inspection, licensing and regulation. Airline inspectors will be responsible direct to the Chief of the Inspection Service in Washington, and although they will confer with supervising aeronautical inspectors when necessary, will work independently of the Inspection Districts. Seven airline inspection bases will be maintained throughout the United States, at Newark, N. J.; Cleveland, Ohio; Chicago, Ill.; Kansas City, Mo.; Fort Worth, Tex.; Los An-

(Continued on page 64)

AIR

hot and otherwise

FRANK A. TICHENOR

Politicians At Work

● It was hardly to be expected that the new control of the Aeronautics Branch of the Department of Commerce would function as well as the old. It is necessary to remember that this highly-specialized government bureau was almost entirely the creation of its former administrators. They superintended its up-building with a keen appreciation of the job which had to be done, and with no regard whatever for its political aspects. In the days of its creation it was recognized by already satisfied politicians then in the saddle that the work of guaranteeing government safety and control to civilian aeronautics was a technical job for scientifically trained men, and that it was a buzz-saw from which greedy politicians should keep their hands.

No one at this date imagines that the spoils system can be eliminated from American politics. A change in political administration must be expected to carry with it a large number of changes in appointive offices. Nevertheless, it seemed logical to believe that in the face of all the warnings given, not only here, but elsewhere, that Federal control and supervision of civilian and commercial flying was a technical job which politicians must never be permitted to monkey with—or at least let us say until every other appointive but safe office had been filled by starving Democrats—that some caution would have been displayed in reorganizing the Aeronautics Branch.

In the light of this belief, it is not only shocking to see the speed with which positions in the Aeronautics Branch have been used for political patronage, but it is upsetting in the extreme to note that the Commerce Department's administration for aviation seems to be the first of all the government activities to be headed for a Congressional investigation.

Too Much Economy Dangerous

There is no reason why the necessity for Federal economy should be dragged into this situation as an excuse, as has already been done by some persons anxious to defend the aeronautics policy of the New Administration. It is perhaps commendable that the Aeronautics Branch took a 36 per cent slash in appropriations as compared with the general Federal departments' cut of only twenty-five per cent, although economizing in a field where the safety of the traveling public is at stake is an under-

taking fraught with a multitude of dangers. Such a difficult task (that is, conceding that economy is the principal desire of the New Administration) would certainly have been better done by old hands experienced in what was essential and what was in a degree non-essential than by novices who were given positions and opportunities merely to prove that higher-up politicians had the power to make such changes.

AERO DIGEST and its readers are familiar with the record of the men who have been placed in key positions in the Aeronautics Branch. Their records as competent workers in the field of aviation cannot be questioned—and will not be questioned here. But there is a still more important fact of which sight must not be lost. By the moguls of politics the Aeronautics Branch is considered just one more branch with a lot of juicy plums on it. To these men it is but one branch in a government department which has been seized upon as legitimate prey by a group of western politicians. It was one of the first departments to pass completely under the domination of political influence at the change of administrations on March 4th last.

After the allotment of the spoils to sectional political chiefs, there appears to be only one demand to prove loyalty to the new Administration head. That demand is for economy. It is the politicians, therefore, and not the technical and even skilled appointees, who hold the reins of economy. Economy as we see it handled in the Aeronautics Branch is a policy of the politicians. It leads to such ridiculous pound-foolish practices—not to say dangerous practices—as reducing the candlepower in airway safety beacons!

The malpractices of the politicians extend into a particularly vicious sphere in disrupting the highly-perfected organization of the Aeronautics Branch under the late administration. The politicians have not been altogether deaf to the impartial warnings that tinkering with the personnel of the highly-technical staffs of the Aeronautics Branch would be a dangerous thing.

Partly recognizing this, they have set about trying to make as much political capital out of the situation as they could. They have said in effect to minor incumbents, "All right, if your job means so much to you, go out and see how many influential Party men you can get who are willing to go on record that it is important that you retain your post." Thus the patronage dispensers in their difficult task have been using technical men, never before involved to any great extent in politics, to silence future demands of district and state leaders, and to keep such leaders "in line" for future party use.

The future Federal administration of commercial aeronautics will take a heap of watching. If it is headed for a quick Congressional investigation, that may not be an altogether bad thing. It seems that we must come sooner or later to recognize that government bureaus which work in scientific fields for the protection of public safety must never be permitted to become political footballs.

Why Should Politics Enter Now?

Maintenance of existing achievements is an easier task than the original accomplishment of those achievements. Nor will the history of bureaucracy bear out the claim that there is more opportunity and temptation for political graft and mismanagement in maintaining and operating a government bureau than in building it up. If politics was not permitted to creep in during the great and important task of laying out the organization for Federal control of aviation, there is no reason why we should suffer it to happen, almost over night, at this stage of the game.

Civilian aeronautics as we enjoy it today in this country was largely a scientific development under the control of a government enjoying a period of unprecedented prosperity. Today the picture has changed. Today the party in control of our government faces a national crisis. In attempting to meet this crisis the better minds of the Democratic Party have warned that there shall be no party politics played in those agencies of the government which are actually at grips with the emergency. This is a commendable stand, but it should not be construed as permission for the petty politicians to gallop off to greener fields, to disrupt and despoil the highly efficient machinery protecting the safety of Americans who travel through the air.

E D I T O R I A L S

"By authority of President Roosevelt's Executive Council, a bulletin is being sent to the head of every executive agency in the Government, directing the use of air mail for all but the most urgent Government messages."

—JAMES A. FARLEY, Postmaster General.

Our Armed Weakness Aloft

• Whenever we are forced to consider the parlous state into which our land air forces are drifting today, we are constrained to think of the excellent job which Secretary Swanson is doing for the Navy.

A very vital defense problem is facing us today in the development of the air power now going on in many foreign countries.

We are rapidly falling behind all the great world powers in our Army strength, especially in the air. But then we reflect that Mr. Dern is not Mr. Swanson.

Although we have always maintained a weak Army, for which we have paid terrible penalties, until recently we were relatively in a good position in air strength. Unless appropriations are immediately forthcoming we will find ourselves ranking with so-called third-rate powers in our military air establishment. The Army is charged with the land defenses of the country and necessarily the air defense on land devolves on the Army Air Corps, as Naval aviation accompanies (and is part of) the fleet.

We have approximately eighty-five hundred miles of frontier to care for—all vulnerable to air attack, either from land base or foreign soil or from hostile carriers. In addition we have extensive possessions detached from our mainland in Alaska, Hawaii, Guam, the Philippines, Virgin Islands and Cuba.

A careful study of our military plane strength (we cannot help recalling how much better is the situation in the Navy) shows the following disquieting condition:

Of observation airplanes available for war we have in the United States, with the Regular Army, one hundred and nineteen and with our National Guard one hundred and nine—a total of two hundred and twenty-eight. These planes are essential for observation, reconnaissance and regulation of artillery fire, but are not actual fighting planes and would be of little use in opposing hostile aircraft.

The combat planes, comprising the bombardment, attack and pursuit (and they are very few), are the only ones which should be counted in an estimate of air strength. Although we have some five hundred combat planes, the neces-

sary deductions to supply the schools and other essential air activities leave only two hundred and sixty planes available for combat duty.

These planes are divided approximately into thirty-five attack, seventy bombardment and one hundred and fifty-five pursuit. This allows one plane for approximately thirty miles of front, *with no planes in support or reserve.*

The attention of the Administration is invited to this alarming state of affairs and the recommendation is made that money be obtained immediately to begin its correction.

Learning the Value Of Air Power

• Much attention has been given in the newspapers recently to the revived interest in China in military aeronautics. Under the direction of Colonel Jouett, fourteen American instructors are completing the training of 60 Chinese young men who will comprise the finest group of aviators China has ever had.

We congratulate Colonel Jouett and his aides upon the excellent work which they are doing. We hail with enthusiasm the opportunity which this affords for introducing American air practices and air equipment into the Orient.

And without in any way intending to detract from this excellent job of American salesmanship, we wonder if there is a full appreciation of why the Chinese should suddenly become so realistically air-minded.

It is a national movement—a movement by people vitally conscious of what they are spending their money for. One of the methods used to raise the funds to establish a Chinese military air service has been that of the ever-popular lottery. So there can be no doubt that this expenditure by the Nanking government has the full support of the people.

Looking for a practical explanation we do not have to look very far—only back a year or so to the attempted sacking of Shanghai by the Japanese. In that little undeclared war Japanese planes played an important part, particularly in destroying the morale of the civilian population.

One way for a people to learn the value of military aviation is to have it used against them in the cold grey dawn of a day of unpreparedness, but it isn't a very happy way.

The Three-Cent Lettergram

• The "lettergram," which may be sent by air mail for three cents (an idea not infrequently recommended here), has at last found some support among the postal officials at Washington. Postal officials are considering proposals to recommend to Congress in January authorization of this new piece of air mail as well as a two-cent post card to be carried by the air mail.

All of this indicates a hopeful change of viewpoint on the part of the government toward the air mail service. In the past the sole motivating thought of government officials, ever economy-minded, when they considered this service, was to cut down the volume of its business. When first class postage was raised to three cents, the postal heads promptly boosted air mail to eight cents. It should have been left at five—as we know now—and the decreased differential between the first class charge and the then existing air mail charge surely would have resulted in an increased volume of air mail with an attendant revenue return both to the carriers and to the government. But the minds of political office holders, temporarily steeped in postal lore, seldom work after that fashion. Having automatically reduced the chances of volume, they have been busy ever since trying to rectify the resulting deficit by repeated slashes at air mail appropriations.

The official proposal for the "lettergram" indicates a new and healthier deal for the air mail carriers. It looks much like a possible entering wedge to drive through that long-desired goal—"ALL FIRST CLASS MAIL BY AIR."

In the meantime the fight for the novel "lettergram" is not yet won. It cannot be achieved by Presidential edict. New types of mail can be created only by Congressional action. This will require consistent propaganda for the idea. It is an idea for which everyone in aeronautics should work wholeheartedly. A useful fact to remember in fighting for the cause is that the enemies of air mail are wrong when they say that this service is costing the American people fifteen to nineteen million dollars annually. The fact is that of this sum the air mail returns to the government in direct revenue six to seven million dollars. Don't forget it. Quote it frequently.

Adventurers

on

Parade

CY CALDWELL

● Those who maintain that human nature has changed to any great extent in thirty centuries, either for the better or for the worse, will get a jolt if they will read the Bible. In I. Chronicles, 11, 22 they will find this report of a doughty captain in King David's army, somewhere around 1048 B. C.

"Benaiah the son of Jehoiada, the son of a valiant man of Kabzeel, who had done many acts: he slew two lionlike men of Moab; also he went down and slew a lion in a pit on a snowy day. And he slew an Egyptian, a man of great stature, five cubits high; and in the Egyptian's hand was a spear like a weaver's beam; and he went down to him with a staff, and plucked the spear out of the Egyptian's hand, and slew him with his own spear. These things did Benaiah the son of Jehoiada."

And because Ben did these bold things a local reporter set them down for us to read about, 2,981 years afterwards. Possibly Bennie had brothers named Izzy and Moe, who kept a clothing store in Kabzeel; undoubtedly he had many relatives, for those old Hebrews went in for large families, or large families happened to them, whether they went in for large families or not. But not another relative is mentioned. To crash the front page, even in 1048 B. C., you had to do something essentially meaningless, in a big bold way.

The chronicler who wrote that account was the C. B. Allen or Lauren D. Lyman of his day, a reporter who interviewed the hero and said, "Now Ben, give us the low-down on the row you had with those two lionlike men of Moab. We've just got time to make the late edition." Upon which Benaiah said, "Well, feller, it wuz like dis: I had dropped into Tony's for a snifter, when up steps a coupla yeggs from Moab. An' one of 'em sez, 'Kabzeel is a tank town, an' any guy 'at comes from dere's just a ham! Watch yuh gonna do about it?' So natchurly, I ups with a beer mug an' . . ." but you can fill in the details for yourself.

He Had to Live Up to His Reputation

Of course, once Ben had made the papers and had everyone pointing him out and praising him, there was nothing for him to do but keep up his reputation, so he went and knocked the tar out of a poor old lion that someone had captured and kept in a pit; and then he picked a fight with an Egyptian five cubits high, a chap the size of Primo

Carnera, and more than likely just a big cheese in his own quaint way. Konk-ing poor old Primo put the finishing touches on Ben's reputation, and people used to go out of their way to look at him. In fact, King David gave him a job in the Hebrew Army, the same as Harold Gatty got a job in the United States Army after navigating around the world. If Benaiah and Gatty hadn't pulled off bold stunts, neither Army ever would have heard of them.

It goes to show that people haven't changed in 3,000 years. Now you skip from Benaiah, the son of Jehoiada, to Wiley, the son of Mr. Post, and you'll find that the same line of thinking still holds good: the scribes write about him and the crowd admires him. It isn't everyone who can fly solo around the world in a week or slay a lion in a pit in 1048 B. C. Both are very difficult feats; I don't think that I could accomplish either one of them. So I admire men who can defeat lions and oceans with ease.

Wiley Post Consults on Flight

A year ago last spring Wiley visited me at Fallen Arches, my Long Island estate (two lots, 40 x 50) where I am growing old gracefully and casting my fast-dimming eyes on the passing aeronautical scene. Wiley journeyed to this secluded rural retreat to discuss his 1933 world flight and to get my reactions to his plan. I still don't know why he wanted my opinion, for I've been guided by it myself through the years and it has turned out to be practically valueless. But we flew around the world that afternoon, in theory, which is the way I do all my long distance flights. We made it non-stop, refueling en route; I handled the hose and corkscrew.

Well, you six readers know how I have lauded commercial flying through the years and glanced askance at sensational flights. You might suppose I would try to discourage Wiley's attempt. But I didn't. I knew that if the engine kept going he'd make it. He has the spirit of D'Artagnan and the physical

and nervous make-up of a placid bulldog, an effective combination. So I advised that he go to it, using the publicity angle that it was a sporting proposition and not undertaken especially to "advance aviation" because that reason has been worked to death, and nobody with any sense believes it anyhow. These pilots who try long and dangerous flights go because they want to go, because they simply yearn for adventure and the joys of conquest—just as old Benaiah had to slay a lion and an Egyptian and a couple of guys from Moab, because that seemed a desirable thing to do at the moment. I think also that the financial returns, that none of them can really count upon, are aside from the point. Naturally they hope to win a return for their investment of time and money and the risks they take; but they'd go if they didn't make a dime out of it. They're built that way.

Last month I sat in Radio City Music Hall and heard Wiley going through the interview that enabled him to collect \$5,000 for the week. The old boy seemed to be suffering. But of course one can endure a lot of suffering for \$5,000. Wiley was holding out stoutly. If he was wealthy you wouldn't find him on any stage or on any lecture platform; and he'd still be flying around the world, for nothing. But he must collect money where he can in order to continue his expensive aerial pastimes. It probably took more nerve for him to face 6,200 movie fans five times a day for seven days than it did to cross Siberia.

He was a trifle handicapped by his stage partner, who insisted on referring to him as "America's Hero," which is an embarrassing title to live up to. Wiley could go around the world alone, but on a stage he can't solo. They got Jimmy Wallington of the N. B. C. announcing staff to prime him with questions and pump up a few replies, and Jimmy glowed on the job just as he does when crying the merits of fresh coffee over the air. Wiley earned his fee.

Continuing our theatrical tour, let's
(Continued on page page 64)

PRIVATE FLYING

Additional Pageant Feature Announced

IN ADDITION to the events announced in the August AERO DIGEST for the National Charity Air Pageant at Roosevelt Field, L. I., N. Y., October 7-8, an effort to increase the record for landplanes over a three-kilometer course will be made, according to the managing director, John S. Reaves. Several outstanding pilots are scheduled to make the attempt.

The Montreal Light Aeroplane Club will defend the Texaco International Aero Club trophy in the Aero Club relay race. Contestants on the teams in this race will fly the same plane, landing it at the end of a lap for the next team member to climb aboard and take control. Teams from New York, Westchester and Philadelphia aero clubs have already entered the competition.

Pageant Preliminary Events Held

SEVERAL entertainments took place recently in the interests of the National Charity Air Pageant, to be held at Roosevelt Field, Mineola, L. I., N. Y., October 7 and 8. Among these affairs were an air meet July 30 at Newport, R. I.; a Sky Night fete at the Westchester Country Club, Rye, N. Y., August 4, and an aerobatics exhibition August 13 at Sands Point, L. I., N. Y., in which were featured Maj. and Mrs. Alexander P. de Seversky, Capt. J. Errol Boyd and Tex Bohannon. The events were held under the auspices of the United States Amateur Air Pilots' Association, sponsors of the National Charity Air Pageant.

Entries Received for Treasure Hunt

OVER THIRTY ENTRIES have already been received for the aerial treasure hunt extending from St. Louis, Mo., to Roosevelt Field, Mineola, L. I., N. Y., October 3-7. The hunt will be held in connection with the National Charity Air Pageant to be conducted at Roosevelt Field October 7 and 8 under the auspices of the Sportsman Pilot Association of America, the United States Amateur Air Pilots Association, the Judson Health Center and the Emergency Exchange Association for the Junior League chapters. The Bernarr Macfadden trophy and nearly \$2,000 in cash prizes will be offered as awards in the hunt, to be held under the sponsorship of Mr. Macfadden and *Liberty* magazine.

The treasure hunt is open to any qualified pilot. Gasoline, oil, hangar fees and hotel bills will be contributed for all contestants in the event.

Flier Aids Group Stranded on Island

BLANKETS, water and food were dropped to a party of thirty-three persons marooned on Bird Island in the heart of the Great Salt Lake, Utah, recently by

pilot Art Mortensen. The flier was forced to circle above the island several times, in order to scare away thousands of pelicans and other birds, before flying to within about 200 feet of the stranded group of people, to whom he dropped 250 pounds of supplies.

Mollisons Honored by Clubs

THE NEWLY FORMED Transoceanic Fliers of America organization entertained Capt. James A. Mollison at a luncheon at the Beaux-Arts Apartments in New York, N. Y., August 7. Members of the group who attended the meeting included the following: Harold Gatty, Clarence Chamberlin, Walter Hinton, Roger Q. Williams, Clyde Pangborn, Frank Courtney, Holger Hoiriis, Otto Hillig, George Haldeman, George Noville, Emil Burgin, William Alexander, Bennett Griffin, James Mattern, Robert G. Lyon and J. Errol Boyd.

While her husband was being entertained in New York, Mrs. Amy Johnson Mollison was guest of honor at a luncheon given by the Ninety-Nines at the Long Island Aviation Country Club, Hicksville, N. Y.

"Ariwa" Holds Open House at Airport

THE "ARIWA" Club conducted an open house at Rhode Island State Airport, Hillsgrove, recently. An aerobatic exhibition by Edna Gardner was a feature of the entertainment.

Wiley Post on Long Air Tour

FOLLOWING a visit to his home at Oklahoma City, Wiley Post, holder of the 'round-the-world speed record, started last month on a two-month tour of the United States in his record-breaking Lockheed, *Winnic Mae*. Plans for the tour itinerary included all the larger cities of the United States, it has been reported.

Northwest Business Men Form Club

BUSINESS MEN of the twin cities of Kelso and Longview, Wash., recently organized the Kelso-Longview Flying Club. The club members plan establishment of a ground school at an early date.

Wichita Women Choose Group Heads

OFFICERS elected at the annual meeting of the Wichita, Kans., division of the Women's Aeronautical Association include: Mrs. Eldon Cessna, president; Mrs. Lewis G. Sinning, vice president; Mrs. R. O. Schamp, secretary, and Mrs. Walter Beech, treasurer. Directors will be the officers, Mrs. Eugene N. Smith, retiring president; Mrs. H. G. Odell, Mrs. William Snook, Mrs. Harold G. Edgerton, Mrs. Ted Wells and Mrs. Herbert Mellor.

Alton Club Assumes New Name

THE ALTON Aeronautical Club, Inc., of Alton, Ill., described in the July issue of AERO DIGEST, decided recently to change its name to the National Aeronautical Club, Inc. The formation of chapters in various parts of the United States is contemplated, with national headquarters at Alton.

Plane and Speedboat in Regatta Chase

A GAME of tag, played by an airplane and a speedboat, was a feature of a recent regatta marking the opening of the twenty-fifth season of the Maryland Yacht Club at Baltimore, Md. Col. William D. Tipton of the Curtiss-Wright Flying Service was pilot of the airplane. Allan C. Davis, an aviation enthusiast, is commodore of the yacht club.

Negroes Make Transcontinental Flight

TWO NEGRO aviators, Dr. Albert Forsythe and C. Alfred Anderson, completed a leisurely round-trip transcontinental flight at the Atlantic City, N. J., airport July 28. They took off from Atlantic City July 17 for Los Angeles, Calif., where they arrived two days later. They made the return flight in about a week.

A Country Club for the Air Minded

SEVERAL prominent aeronautical persons in the vicinity of Detroit, Mich., have joined Lakelands Golf and Country Club near Brighton, Mich. Located about twenty minutes by air from Detroit, the club has a landing field placed in the middle of its golf course.

National Women's Group Elects

AT THE ANNUAL meeting of the Women's National Aeronautical Association in Chicago recently the following officers were elected: President, Mrs. George Shaw Green of Dayton, Ohio; first vice president, Mrs. Don M. Peabody of Coral Gables, Fla.; second vice president, Mrs. Ulysses Grant McQueen of Beverly Hills, Calif.; secretary, Mrs. Margaret Herron of Dayton, and treasurer, Mrs. Ralph Messer of Oklahoma City, Okla. Directors named include the following: Mrs. Carlos Reavis, Mrs. Charles L. Morris, Mrs. A. G. Stear and Mrs. Edna Christofferson.

Middle-Aged Fliers' Club Formed

THE OVER-FIFTY CLUB, a group of men who are more than fifty years old and who have flown solo, has been organized. E. W. Wiggins of the Rhode Island State Airport at Hillsgrove, Arthur L. Johnson of Providence, Frank T. Coffyn of Woonsocket and F. Arthur Hinchcliffe and William Beakes of Boston, Mass., are among the members.

Training at the Ryan School of Aeronautics

EARL D. PRUDDEN



● ELEVEN years ago Claude Ryan, after five years of military and Government flying, started his commercial flight activities less than a mile from the present site of the Ryan school. Last year the Ryan School of Aeronautics, with Ryan as its energetic and active president, erected on Lindbergh Field, San Diego's \$2,000,000 municipal airport, one of the most modern groups of buildings devoted to aeronautical training. Surrounded by date palms and tropical shrubbery, these Spanish type masonry buildings with their tile roofs, cement drives, paved aprons and runways, fenced-off enclosures for automobiles and spectators, passenger-loading canopies, public address system and complete airport terminal facilities with every type of aircraft coming and going, present one of the most interesting pictures of well-organized present-day commercial aeronautical activity where student training is conducted on a sound business basis. Whether the incoming student arrives by air, drives cross-country in his own car or comes by train, one of his first impressions of the new buildings is that of modern, regulated orderliness with a resultant feeling of confidence in the school which he has selected for his instruction.

Inasmuch as the Ryan school operates throughout the entire year, and as weather conditions are such an important factor in the continuous operation of student flying schedules, Ryan originally selected and has consistently maintained San Diego as the base for all of the school's training activities. Favored by a semi-tropical atmosphere with mild winters

and temperate summers, this tourists' paradise in the southwestern corner of the United States is the home of the Government's largest aeronautical operating base and is famous for its military and commercial aeronautical developments. With its minimum variations between summer and winter temperatures, freedom from storms and usual unsettled conditions, San Diego enjoys a year-round weather chart which makes it possible for the student to fly with day-to-day regularity, plan in advance for cross-country flights which are carried out on schedule, take his final flight examinations from Department of Commerce inspectors at appointed times and finish his entire course in less elapsed time and with a more creditable showing than would otherwise be possible.

Transport Course Advised for Sportsmen

A student who is more interested in sport flying than in commercial activities is advised to take the transport course and receive the benefit of the advanced instruction and complete ground school which that course provides. During the first three months his day is divided between two hours of ground school lectures, flight lessons ranging from thirty minutes to an hour, and the balance of the day spent in the maintenance and repair departments or on trips through the huge Government shops and aeronautical departments at North Island. During this three-month period the student will gain about sixty hours of flying experience, the majority of which time will have been spent in consistent practicing of funda-

mental and some advanced flight maneuvers. During his remaining three months' training period, flight schedules are increased and varied with advanced work. This includes heavy cabin ship instruction, night flying, blind or instrument flying, precision practice in formation flying and extensive cross-country training. Students look forward to their cross-country flying with keen anticipation, for California not only has the greatest number of airports of any state in the union, but the terrain of the surrounding country is so varied in type that it offers new experiences for the pilot. Overnight flights to San Francisco or the Boulder Dam at Las Vegas, Nev., present an ever-changing panorama of orange groves, mountains, fertile valleys and desert country, while a flight from airport to airport over the shore of the Pacific is a trip never to be forgotten.

Occasionally the school injects an added interest into its student cross-country trips by clearing the planes through the international customs and arranging for flights into Old Mexico with stops at the famous resort centers of Agua Caliente or Ensenada. In this way, the school endeavors to balance the most systematic and valuable types of flight training with interesting experiences of an aeronautical as well as general educational nature. These flights are usually made with groups of from three to five students flying planes of similar make and horsepower. In this way the instructor is able to keep the planes together, set similar courses and

(Continued on following page)



Ships of the Ryan School on the line by the school's hangar and a Fokker of American Airways in front of the passenger terminal

NEWS OF THE SCHOOLS

Hunsaker Joins M. I. T. Faculty

COMDR. JEROME C. HUNSAKER, vice president of the Goodyear-Zeppelin Corp., has been appointed head of the mechanical engineering department at Massachusetts Institute of Technology, Cambridge, Mass., it was reported last month. He succeeds the late Edward F. Miller, who headed the department for many years. Commander Hunsaker is a graduate of the Institute and was recently awarded the Daniel Guggenheir Medal for 1933 in recognition of contributions to aerodynamics, aircraft design and the practical construction and commercial use of rigid airships. He will take up his new duties this month at the beginning of the academic year, having charge of research and instruction in aeronautical engineering and meteorology.

Wind Tunnel in Tri-State Exhibit

A MINIATURE portable wind tunnel, every part of which, except the motor, was designed and built by students of the department of aeronautics, Tri-State College, Angola, Ind., is on exhibit in the booth belonging to the college in the Hall of Social Science at A Century of Progress, Chicago, Ill.

The tunnel is of the atmospheric type, open at both ends, 20 inches in diameter, with an all-over length of 48 inches, accommodating a 15-inch model airplane. Power is provided by a General Electric 1/2-horsepower motor, to which is coupled a four-inch blade propeller with a nominal pitch of 30 degrees. An air velocity of 30 miles per hour can be obtained through the working section. Three calibrated pointers and balances are mounted so that the lift and the drag of the airplane can be read directly by observers. The motor has three speeds, giving three air stream velocities, which show the forward speed and relation existing between lift and drag.

Philadelphia Evening School

THE AERO CLUB of Pennsylvania, with headquarters in Philadelphia, is reported to be probably the only organization of its kind responsible for the maintenance of an evening aeronautical engineering school. Negotiations were begun in 1930 with the Pennsylvania State College Department of Engineering Extension, and as a result the first three classes were formed in the fall of 1931. Representatives of the Department of Commerce have aided in the formation of classes and the development of instructional data.

Subjects taught during the first school year were engineering mathematics, elementary theory of flight and nomenclature, and aerodynamics. The curriculum

for the second year (1932-33) was broadened to include aeronautical drafting, mechanics and stress analysis. The school enrollment increased more than 100 per cent the second year.

The course of study is planned to require three years of study and class work for the students. Credit is allowed students for similar subjects taken at other institutions. Instructors are selected from the engineering departments of the various local aeronautical industries, including the U. S. Naval Aircraft Factory.

Louisiana Adds Aeronautical Courses

LOUISIANA State University, Baton Rouge, La., has announced the establishment of a department of aeronautics in its College of Engineering. The department includes a curriculum in aeronautical engineering and one in commercial aviation. Each will include flight instruction, to be handled on the same basis as other laboratory work.

Courses in the aeronautical engineering curriculum include flight theory, elements of aeronautical engineering, flight training, propellers and airships, theoretical aeronautics, aeronautical laboratory, aeronautical power plants, aerodynamics of airplane design and airplane design and practice.

The course in general business is the basic subject in the commercial aviation curriculum, allowing specialization during the sophomore year in commercial aviation problems and principles of commercial aviation. Other courses in the curriculum include aviation insurance, aeronautical meteorology, air transport management, airport design and construction, aircraft radio and lighting, aircraft instruments and navigation, airport management and air transportation.

Flight training will not be confined to students in the department of aeronautics, but will be offered to any student of the university who has passed the Department of Commerce prescribed medical examination. The system used will be modeled after that of the Army Primary Flying School, but it is not intended to train students to become professional pilots. Any eligible student who wishes to take further flight training may do so on payment of an additional fee.

Woman Flier Passes Rigger's Test

MISS MARY ELIZABETH OWENS, 20-year-old transport flier of Fort Worth, Tex., recently received her Government parachute rigger's license. Her grades were 99 and 90 in the two divisions of the Department of Commerce examination. She prepared for the examination under the instruction of Leon McKennon, parachute jumper and rigger, of Love Field, Dallas, Tex.

Roosevelt School Holds Air Meet

NORMAN N. WHITESIDE, winning the spot-landing contest, and Charles J. Egler, who placed first in bomb-dropping, were awarded trophies recently for their achievements at the student air meet of Roosevelt Aviation School of New York, N. Y., and Mineola, L. I., N. Y. About fourteen fliers took part in the meet.

State College Offers Aeronautics

A SCHOOL of aviation at Mississippi State College has been approved by the Central Board of Control of State Institutions and will offer two four-year courses. One course will be in commercial aviation under the business administration department and the other in aeronautical engineering in the engineering school.

TRAINING AT RYAN SCHOOL

(Continued from preceding page)

navigation problems for all ships and keep the students on an equal competitive basis for the determination of flying grades. As the official airport of entry for planes flying across the border, Lindbergh Field gives students an opportunity of inspecting a constantly changing and interesting variety of ships. Numerous visiting planes which land at the airport daily add activity to the frequent schedules maintained by three major airlines.

As proper navigation is one of the prime requisites for accurate cross-country flying, the school has recently enlarged its scope by forming an advanced navigation department under the supervision of one of the foremost navigation authorities, Lieut.-Comdr. P. V. H. Weems, U. S. N. (Ret.). Associated with him in this instruction is Lieut.-Comdr. Paul Bates, U. S. N. (Ret.), formerly executive flight officer on the aircraft carrier *U. S. S. Langley* and executive flight officer, Naval Air Station, Norfolk, Va.

Never before have young men had the opportunity to take a major part in the development of a new industry as that which aviation presents today. Great as has been the expansion of aviation, the surface of opportunity in this direction has just been scratched. But the two outstanding qualifications—thorough training and hard work—are more important today than ever before. Knowing these facts, the Ryan School of Aeronautics feels that it owes an obligation to both students and industry—an obligation that can be discharged only by an honest statement of facts and the providing of the finest facilities and most thorough training methods possible to prepare its students for the increasing number of opportunities presented and the increasing obligations which aviation imposes.

Third article of the series on Aircraft Marketing



Now Let's Check the Sales Machine

CHARLES J. CUTAJAR

IN the preceding article it was pointed out that the aircraft salesman today has a greatly improved product to sell—that the cost of travel by private plane compares favorably with other means of transportation—that prospective owners are more readily discernible through character traits and temperament than by criteria of class, occupation or wealth. In this article the important functions of the manufacturer's sales organization are reviewed. Next month's article will discuss ways and means of getting business

● "Gather around, you Peddlers, while Uncle Don tells of the time he pulled off the sweetest little stunt that ever sold seven airplanes in one week—yes, Sirree, seven of 'em. . . . Got another one of those smokes, Joe? Thanks. Hold that light." And do the boys gather around to hear old Hy Pressure in person tell how he put over a fast one? You're right. A salesman dearly loves to hear stories of the smart tricks and devices that prove, after all, that the salesman is king and that most of the stuff that comes out of the home office is "hog wash."

Be that as it may, any of you readers who are following these articles in the sole hope of being tipped off to some cute sales stunts to add to your bag of tricks are 90 degrees off your course and flying blind. Not that, while snooping around, we haven't brought to light one or two nice little stories which we may pass on to you at the proper time. But simply that we are concerned more with the long haul than with the occasional spurt or the selling frill often resorted to as a substitute for *real selling power*. Smart tricks succeed sometimes, but the right fundamentals in salesmanship are important all the time. If we can first put the marketing of aircraft on a basis of sound procedure, then the stunts of the bright boys will work a lot better.

Now that may be taken as a broad hint that current policies in the sale of aircraft could be improved. Without pressing that point, let us rather take the po-

sition that a perfect sales formula has never been found in any business and that success is assured only by constant study and, indeed, by frequent adjustment to meet changing conditions. In a recent survey of policies that helped business concerns to forge ahead during the late depression, the U. S. Department

of Commerce reported 358 firms as follows (some are registered in more than one class classification):

Finance—5.
Administration—7.
Production—59.

Product (technical research, specialization, packaging, diversification, improved appeal, new products, quality)—91.

Marketing (following style trend, improving service, management of men and territories, cooperation with dealers, marketing analysis, price policies, improved sales effort, improved advertising . . . one-third of entire marketing classification)—254.

Thus 70% of the firms investigated in a variety of industries found a way to progress through intelligent changes in marketing methods. We, too, may profit by revisions of practice in a business in which organized sales effort is still in the budding stage and in which results as a whole are far from satisfactory. So let's take a look at the book.

Pricing for Profit

The first law and commandment of profitable selling is Pricing for Profit. That, to quote W. L. Churchill of the John R. Hall Corporation, "puts marketing upon a basis of positive control of profit results and increases the importance, responsibility and authority of the selling function of management."

The laws governing price are as exact

and inexorable in effect as those governing the flight of an airplane. Yet the apparently great divergence in the announced prices of airplanes leads to the belief that there is much pricing that is unsound. Until that is corrected there will continue to be much that is unsound in the business structure of the industry.

The scientific price is not a percentage of mark-up from production costs. The object is to find the right volume for the greatest price, not merely the price that will induce the greatest volume. The price must provide sufficient margin for *an adequate volume of sales effort* and produce earnings to permit investment in research, development, expansion and changes to meet changing conditions. In short, to insure the perpetuation of the business structure.

If the airplane you have in mind does not justify a volume of production sufficient to enable it to be sold in substantial quantity at a price that will cover all essential costs of production, sales and service, and to meet profit requirements, it were better not to build such a plane than to be forced to sell it at an uneconomic price—and far less disrupting to the industry.

Build Your Full Quota

Plan as accurately and as cautiously as you will, but then *go ahead and build*. Don't just get out a few demonstrators in the spring and then wait until the peak season is at hand to see how the market "develops." That not only boosts your costs, but emasculates your *will to sell* and sends your salesmen out walking on their heels ready to be toppled over by the first sign of resistance. If your production is sufficient to bring price in line with reasonable sales opportunities, and if a real selling executive *with full powers* is at the helm, you will fulfill your sales quota, whether it be a score, a hundred, or more airplanes. We are talking about spring and summer, 1934.

With a scientific quota, based on profit on a known volume of production, the sales budget is firmly based on the task

ahead. How, then, shall distribution be effected?

Dealing with the Dealer

The conventional policy in the industry is to sell private planes through distributors, dealers and agencies. Under this system the manufacturer receives commitments and cash early in the season and is relieved of a good share of the risk in the ultimate disposal of his output. This method, also largely prevailing in the marketing of automobiles, boats, household equipment and other high unit merchandise, appears to answer present purposes, especially in the absence of any far-flung and highly organized sales mechanism.

The chief weakness in selling through independent or semi-independent sales organizations lies obviously in the loss of undivided control over the manner in which the manufacturer's product is presented to the ultimate buyer. That being the case, and since the manufacturer's chances of success in disposing of his full current production as well as his reputation and hope of continued success, depend upon the proper functioning of the sales agency or middleman, it becomes his vital duty to select his dealers with the utmost care and to school them thoroughly in the job to which they have been appointed.

Dealer Relationships Vary

In selecting dealers some manufacturers have rightly chosen with permanency uppermost in mind. Their relationship with dealers is one of mutual confidence and respect. They furnish real protection against price chiseling and territorial infringement from nearby dealers, self-appointed tipsters and surreptitious factory sales. They recognize the dealer's right to a liberal discount to cover his overhead, his expenses for sales promotion, demonstration, instruction, etc., and to allow him a fair profit. In short, they stand for a square deal throughout.

Other manufacturers have adopted a tongue-in-cheek policy of appointing a "dealer" almost every time that a plane is sold with the idea of eventually building a dealer organization from the fit survivors. Still other manufacturers have cut dealer discounts to one-half the normal allowance, reasoning that the close pricing of their product will lower sales resistance to an extent that will enable the dealer to dispense with much of the customary sales effort. Under this last system it would seem that customer-service might suffer.

It is no concern of ours, but we are laying a little side bet on one manufacturer in particular who is getting a price that would appear to be commensurate with the high quality of his product and who is winning the enthusiasm, cooperation and lasting loyalty of his dealers by

fair and sympathetic treatment, aggressive promotion and sustained advertising. We believe he will be one long jump ahead of the field next year when the going becomes fast and a real dealer organization is a prime necessity.

Good Dealers Are Trained Dealers

When the dealer has been appointed, the manufacturer will cooperate with him in drilling his salesmen in the most effective sales presentation, in the display and demonstration of the plane, and in all other phases of the complete sales transaction. For the greatest efficiency the manufacturer will furnish an outline of an entire selling talk, giving the salesman every cogent and demonstrable fact and argument for use in persuading the prospective purchaser that he needs (or wants) a plane, that the plane in question meets his needs, that the dealer and his organization are worthy of confidence, that the values, prices and terms are satisfactory and that the present is a good time to sign up—keeping foremost in mind that the buyer today has an eye to low cost of operation and maintenance, including parts and replacements. Particularly will complete cost data be necessary in discussing plane ownership with the man who plans to fly for business.

Specific appeals to be given emphasis will vary according to the prospect. Different types of purchasers will be classified in major groupings for special study and analysis and the seasoned salesman will not neglect to gather all possible information concerning the man he hopes to sell.

Standardized Sales Talks Help

The use of the standardized sales talk insures that the salesman will not omit any major selling point; it helps the salesman retain command throughout the interview; it suggests to the salesman what the stage manager calls "business"; it helps the salesman anticipate the unspoken question. Most important of all, it provides the salesman with a continuity or sequence in presentation that serves to guide the mind of the prospect toward a favorable decision.

It is not anticipated that the aircraft dealer or his salesmen will reel off verbatim a pre-prepared sales talk. But he should master it and then use it in his own words. He will find that the expertly prepared talk will improve his selling technique without interfering with his initiative or the force of his personal appeal. He will chose to adopt numerous phrases and expressions that are "suggested" in the skillfully prepared presentation. Indeed, the most effective talks are those prepared with the salesman as co-author after the salesman has been induced to analyze his own work.

Prepared or "canned" sales talks are transmitted to the salesman in a variety

of forms. Some manufacturers use a standardized sales manual or hand book in which every sales situation is anticipated and treated in actual sample dialogues. Such manuals often include complete information of the company and its product so that no additional reference material is necessary. Other manufacturers conduct a complete correspondence course for the salesman in which examination papers are graded and the progress of the salesman is checked periodically. In such cases it has often been found expedient to require the salesman to pay half the cost of the course to instill in him a full appreciation of its value to him.

Sales talks are sometimes reproduced on phonograph records for the salesmen to memorize. In other instances a series of letter-size charts are used which provide the salesman with a skeletonized outline or diagram of a talk which he is left to complete according to his ability and discretion. Sometimes an informal portfolio is used, with pages containing the talks reproduced by inexpensive offset process from typewritten originals and with other pages bearing samples of the company's literature, photographs, clippings of news items and advertisements and other good visual material, forming a graphic presentation. Still other manufacturers visualize an entire sales proposition in either a still or talkie moving picture film which the dealer, equipped with a small projector, may use in his selling.

The Salesman Must Know the Plane

Whatever the means used to instruct him, see that the man who does your selling receives both an elementary and a post graduate course in *selling your plane*. Moreover, make doubly sure that he *knows your plane*. He should have the facts and figures; he should know the names of the parts and materials; he should memorize the dimensions, gauges, weights, all specification data; he should know the performance and truthfully state it. His ability to give all desired information will strengthen his position immeasurably. He should not be in ignorance of the engine. The engine manufacturer will be glad to help you teach the merits of his product and will provide full information of its construction, operation and service requirements. If possible let the salesman have opportunities to see factory work in process.

Nor should flying be a mystery to the salesman. He should not only be a competent pilot, but should know how to handle the plane he sells so as to get the best performance from it. By the way, has any dealer tried a woman pilot as a regular member of the sales force?

Maybe you are beginning to gather the idea that airplane salesmen should not only be thoroughly schooled, but that they should be recruited with care. You are

right. This may seem to be the dealer's prerogative and responsibility, but the manufacturer is bound to investigate the dealer's sales force and advise him on all matters affecting the efficiency of his personnel. Unless the dealer functions virtually as part of the manufacturer's own organization there will be a serious loss in selling effectiveness at the very point where it is most needed. It is at that point, more often than not, that the manufacturer's chance of disposing of his season's output is weighed in the balance.

Do we hear the dealer in the back row rise to inquire whether all this carries any imputation that aircraft dealers are a mighty helpless lot? Brother, we have seen plenty dealers putting up a game fight for existence, struggling to eke out a living twelve months in the year by using their demonstrators for everything but hauling coal. With their often meager capital tied up in shiny new planes, too many of them are compelled to carry on the fight single handed because the manufacturers they represent have shown little capacity to help them sell, have developed no constructive sales program. Naturally there are all kinds of dealers, but many of them need make no apologies for the sad plight in which they find themselves today.

Team Work Vitaly Necessary

The point is this. Neither the manufacturer nor the dealer, alone, can rebuild the aircraft market. It will take organized teamwork right down the line and it is just as much up to the dealer to demand his due in selling aid from the manufacturer as it is up to the manufacturer to exact full cooperation in return for a dealer franchise. The dealer should be more than a mere bird dog to scare up prospects for the manufacturer's representative to rush in and knock over. He should be more than a mere service man for factory-sold planes. He should be a prospect-raising, sales-closing field representative in the fullest sense and when he fails to function as such the manufacturer is fully warranted in making punitive expeditions into his territory.

The Value of Showmanship

How are your planes displayed for public view? To be sure, there are many practical obstacles to be overcome in displaying a plane to the best advantage. Salesrooms are few, fields are dusty and hangars are barren barns and often crowded. Yet, why should an airplane be the only article of commerce presented for inspection amid unsightly and distracting surroundings and without the customary trappings of showmanship?

Wouldn't it be possible to clean up and paint a corner of the hangar as a "showroom"? The cement floor could be covered—there is a new liquid linoleum that

would be excellent for the purpose and quite inexpensive. The plane, clean and waxed, could be displayed amid simple decorative "props" of the kind you have seen at the shows. There would be several comfortable chairs and a table bearing literature, drawings, photos, testimonials, etc., and, discreetly hidden, a sales contract form or two. To assist in a choice of colors, a half dozen or so sample scale models might be displayed, painted in different stock colors and stripings. There might be a talkie machine with a film showing details of the manufacture of the plane and resultant flight characteristics demonstrated by views of actual flight. Two or three baby spot lights placed to best advantage would light up the plane and dispel the gloom of the hangar during sales presentations.

The furniture and "scenery" could be arranged to allow the salesman to guide the prospect to the desired positions so that the plane may be viewed to best advantage as regards streamlining and other design characteristics, to allow close inspection of the tail group, ailerons, landing gear and power plant, and, finally, to permit easy access to the entrance step. Mr. Manufacturer, won't you work out a standard display arrangement which could be reproduced from photographs wherever your planes are displayed? And couldn't you "lend" a few of your live dealers who are working with a single demonstrator, a second plane for purely display purposes?

Flight Demonstrations Do or Don't

Having displayed and "sold" your ship to best advantage you are ready for the demonstration flight which usually ends by demonstrating that you have made or lost a sale. Good weather will have been ordered. The plane and engine will have been checked for first-class performance. The ship will be spick and span inside and out. The extent and nature of the demonstration will be governed according to the flying experience of the prospect. He will appreciate the plane's performance all the more since you have explained the desirable characteristics on the ground—and you will not take him up until you have done this. If he is a "demonstration hound" he will not want the sales talk and if he is a real prospect he will be glad to get it.

After the demonstration you will discover that you have something more to show him back in the hangar where the easy chairs (and the sales contracts) await. Most dealers readily consent to flight demonstrations as a refusal or an ungracious attitude is fatal to the occasionally undetected sales opportunity. It is important, however, not only to grant the demonstration, but to prepare for it with an eye to complete success. The demonstration is the turning point in the sales transaction.

When and Where to Sell

The customary blurb on marketing usually includes the shedding of a few tears over the seasonal dip in the annual sales curve. We are not much worried about that so long as sales remain at a shamefully subnormal level during the best months, May to August. There must be a revolutionary improvement in results obtained during the normal selling season before we need be concerned about the months when the snow is on the ground. The first objective in this respect probably will lead to a concerted attempt to get action in the early spring weeks, now unaccountably barren. In the meantime it may be just as well to give the brokers a clear field to get old production off the market during the "bargain hunters' months."

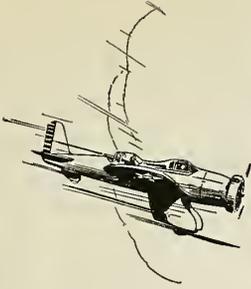
As for territorial opportunities, if your plane has good climb, a snug top or cabin and is convertible for water flying, you may sell it almost anywhere. Everything else being equal, you will be guided in your territorial allotments by figures on the distribution of current aircraft licenses (no, not pilots' licenses), preferably by towns rather than by states. But today "everything else" is most *unequal*, for few manufacturers have more than a handful of dealers who serve at top efficiency. Hence, your map of territorial potentials is really nothing more than a map with a few thumb tacks showing where your live dealers are. We will have to let it stand at that for the present.

Trade-ins and Terms

Your success in this horse-trading stage of the sale will depend to a large extent upon your persistence and effectiveness in selling your own product. In ratio to the buyer's desire for your plane will be his degree of willingness to accept your valuation of his old but affectionately regarded ship. So keep him coming. And when an agreement is reached, get his signature on a written statement of the history and condition of his old plane. That may save you from an occasional and unexpected loss. In cases where the allowance remains in dispute, you might offer a few months' free hangar rental, or other service in part consideration to cut down the cash allowance.

Aside from trade-ins, the most important conditions common to sales terms seem to be (for the buyer) free flying instruction and (from the buyer) cash on the barrel-head, unless his notes are amply covered regardless of the fate of his plane. Bearing on the latter, crash insurance being what it is there seems to be no escape from this formidable obstacle to the broadening of the market for aircraft. For centuries, land and insurance have been sold on deferred payments. 60% of automo-

(Continued on page 58)



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A T T H E A I R P O R T S

First Annual Seattle Air Meet

THE JUNIOR Chamber of Commerce of Seattle, Wash., will be sponsor of the First Annual Seattle Air Show, to be held at Boeing Field September 10. The purpose of the show is to further aviation in the Northwest and to promote Boeing Field, which is a county project. Plans include a race for planes of 100 horsepower or less, also a race for planes of 225 horsepower and under, dead-stick landing contest, altitude tests for planes carrying one quart of gas, parachute jumping, aerobatics and formation flying. It is also planned to have on display the first Boeing air mail flying boat which was in operation in 1918 and which is now owned by the Northwest Air Service at Renton. There will also be displays by planes from the Boeing factory, and possibly test flights by one of the new planes.

Invitations are being given to pilots in Washington, Idaho and Oregon. The committee plans to have a dance September 9 at the field in honor of the visiting pilots.

Air Races at New Orleans

DEDICATION of the new \$4,000,000 Shushan Airport at New Orleans, La., is planned for next year with the holding of the Pan American Air Races there as a part of the Mardi Gras celebration. It has been announced by A. L. Shushan, president of the New Orleans Levee Board, after whom the field has been named.

The five-day period from February 9 to 13, inclusive, has been set aside for the races, which will be staged under the management of Clifford W. and Phil T. Henderson. The Hendersons have announced that they hope to develop the New Orleans show as an annual mid-winter affair.

Shushan Airport is a combined base for landplanes and seaplanes. It was formed by constructing a semi-circular sea wall out into Lake Pontchartrain. The 320 acres thus reclaimed were filled in, and facilities for both land and water craft provided.

Tulsa Field Makes Annual Report

NET OPERATING PROFIT of \$5,-966.94 before depreciation has been reported for the fiscal year 1932-33 by C. W. Short, Jr., manager of Tulsa (Okla.) Municipal Airport. For the year ending July 1, a total of 101,650 persons have been transported in and out of the airport in 22,210 planes, exclusive of taxi and school operations. This marks an increase of 3108 persons and 900 planes over the previous year.

Short Reappointed at Tulsa Airport

CHARLES W. SHORT, manager of the Tulsa, Okla., municipal airport, has

been reappointed by the park board for another year. Mr. Short has been manager of the port since it was opened.

Texas Airport Is Projected

PLANS are under way for the establishment of a municipal airport in Farmersville, Tex. The field will be located at the C. C. C. camp east of the city.

Parachute Station Opened at Somerton

AN APPROVED parachute packing station has been established at Somerton Airport, Philadelphia, Pa. Complete facilities for repair and packing of parachutes are available.

Michigan Fields Are Reopened

THE DEPARTMENT of Commerce emergency field located at Monroe, Mich., which was recently closed as an economy measure, has been reopened under the joint management of the State Board of Aeronautics and the Monroe Industrial Commission. The Industrial Commission has leased the landing field property, and the Board of Aeronautics has entered into an agreement with the Department of Commerce for leasing and operating the lighting equipment.

The Holland airport also is open again under new management. Some grading and leveling has been done on the field.

Maryland Firm to Promote Aeronautics

PLEASURE AIRWAYS, INC., Rutherford Field, Baltimore, Md., has been chartered for the purpose of encouraging and promoting interest in aviation in that section. There is no capital stock. The incorporators of the corporation include Annesly E. Hudson, Herman Krickler and Raymond McNemar.

Athens, Ohio, to Have Airport

AN IMPROVED, official airport will be established at Athens, Ohio, according to an announcement by Capt. Fred L. Smith, state director of aeronautics. The city will provide labor through men receiving R.F.C. relief, and the state will supply the equipment and the engineering supervision.

Bridgeport Field Named for Mollisons

CAPT. JAMES A. MOLLISON and Mrs. Amy Johnson Mollison attended ceremonies at Stratford, Conn., August 4, when the Bridgeport Airport at that place was renamed Mollison Airport in their honor. The field was the one at which the Mollisons cracked up July 23 following their trans-Atlantic flight. Among others at the airport ceremonies was Lieut.-Comdr. Frank M. Hawks, who flew from Regina, Sask., a 1,700-mile distance, in 7 hours 50 minutes.

New Airport in Philadelphia District

THE PHILADELPHIA Main Line Airport, northwest of Paoli, Pa., has been opened as a fully equipped field. The operator is John D. Jacob, who formerly conducted a flying service at Sky Haven Airport. The new field will serve the same territory which Sky Haven served until closed last September.

The field has been enlarged to eighty-six acres and has been cleared. According to a recent report, runways and landing strips were being constructed, five private hangars were practically completed, and ten more were to be built. A remodeled barn will also house planes, and an old sixteen-room stone mansion is to be remodeled as a clubhouse.

The new flying center, at which the Wilford Gyroplane has been tested, will be jointly occupied by the Main Line Flying Club and the Main Line Air Service, headed by P. F. Smith, former instructor at Sky Haven Flying School.

Airport Publishes Bulletin of Events

SAN FRANCISCO BAY Airdrome, Alameda, Calif., has begun the monthly publication of a "Fliers' Bulletin," which lists events scheduled at points that can be conveniently reached by air from the airdrome. The events listed are not necessarily of an aeronautical nature but are of a type that is expected to appeal to the sportsman pilot. The name and location of the nearest airport are given for each event in the list.

Improvements at Nebraska Field

FIFTEEN MEN who were receiving relief from charitable organizations at Lincoln, Neb., were employed by the city for several weeks this summer making improvements at the municipal airport. Cement walks were installed on three sides of the new depot and administration building, which was completed at a cost of \$22,000; a loading apron 50 by 75 feet and connected with the building entrance by a cement platform was constructed, the approach to the new building was sodded except for a parking place for automobiles, and a semi-circular drive for automobiles from the entrance of the field to the new building was made. Further improvements for the airport are contemplated in the near future, the first of which will be resurfacing of the runways at an estimated cost of \$2,000.

The airport returned a profit last year for the first time, and a larger return is expected this year, since the engineer has obtained permission to dispense with the airport boundary lights at night when planes are not coming in. This will mean a saving of approximately \$1,000 annually, it is reported.

(Continued on following page)



Best PROOF of Bellanca Dependability

ALTHOUGH Bellanca Airplanes have constantly been improved year by year—speeds increased and refinements added in cabin arrangement and appointments—the same design which has earned so enviable a reputation among veteran pilots, has made possible such outstanding accomplishments as the following:



J. Erroll Boyd

Capt. J. Erroll Boyd and Lt. Harry P. Conner, U.S.N., took off from Harbor Grace, Newfoundland, and landed their Bellanca, October 10, 1930, at Scilly Isles, England.



Roger Q. Williams

On July 9, 1929—Roger Q. Williams and Lewis A. Yancey landed their Bellanca—"Pathfinder"—at Santander, Spain, at the end of a flight from Old Orchard Beach, Maine.



Clyde Pangborn

Clyde Pangborn and Hugh Herndon spanned the Atlantic from Floyd Bennett Field to Cardigan, Wales, in the Bellanca, "Miss Veedol."



Russell Boardman

Two months later, on October 5, 1931, these two pilots, flying this same Bellanca ship, made the first—and only—non-stop flight across the Pacific—Samishiro Beach, Japan, to Wenatchee, Washington—4,486 miles—completing a tour of the world.



Lewis A. Yancey

World's Long Distance Record established by Russell Boardman and John Polando, July 30, 1931—Floyd Bennett Field to Istanbul, Turkey—5,011 miles in the Bellanca, "Cape Cod."



Hugh Herndon

Clarence Chamberlin and Levine startled the world on June 4, 1927, when they landed their Bellanca—"Columbia"—at Eisleben, Germany—3,911 miles from New York City.



Sir Holger Hoiriis

June 25, 1931—Sir Holger Hoiriis and Otto Hillig landed their Bellanca—"Liberty"—at Krefeld, Germany, after their take-off from Harbor Grace, Newfoundland.



ALONE above a wind-tossed ocean—hundreds of miles beyond sight of land—fighting sleep and exhaustion and grimly holding the ship to her course—there's the place, these world-famous pilots will tell you, where Bellanca's unflinching dependability has won their everlasting respect.

Seven times, Bellanca ships have spanned the Atlantic—once, the 4500-mile crossing of the Pacific—the only time this feat has ever been accomplished. They have won every efficiency contest they have ever entered and have set endurance records that are still unexcelled—and many Bellancas flying today, have piled up mileage records which are almost unbelievable.

What better evidence could be cited of Bellanca dependability—what more convincing testimony to the efficiency of Bellanca design and to her sturdy construction.

Bellanca airplanes—the Pacemaker Senior, the Skyrocket Senior, and the Aircruiser—provide satisfying speeds within the limits of safety.

BELLANCA AIRCRAFT CORP., NEW CASTLE, DEL.
BELLANCA AIRCRAFT OF CANADA, LIMITED, MONTREAL



(Continued from preceding page)

San Francisco Bay Field Day

A ROUND-TRIP flight from San Francisco Bay Airdrome to Los Angeles in a Varney speed plane was won by Roman F. Macaya at the San Francisco Bay Airdrome's recent first field day for amateur pilots having less than seventy-five hours of solo flying. Prizes for the four events were donated by the West End Merchants' Association of Alameda. Sweepstake prizes were awarded by Varney Speed Lines and Bear Air Lines. C. H. McDonald received the second highest score of the day, and Robley Robinson won the spot-landing contest.

Unemployed Improve Rhode Island Port

INSTALLATION of a drainage system at the Rhode Island State Airport at Hillsgrove has been completed. The work was done by unemployed, paid out of a state fund. Besides installing the drainage system, the unemployed removed a clump of tall trees on adjoining property, which was a menace to air navigation, and did filling and grading and landscape gardening around the administration building and parking areas.

New Official Airport Periodical Issued

ANNOUNCEMENTS of new facilities and notices of changes at airports and on the Federal airways system will appear in the new bulletin of the Department of Commerce, "Weekly Notices to Airmen," mailed only to airports and scheduled air transport operators. This material will not be published in the "Air Commerce Bulletin," which is no longer a semi-monthly, but a monthly publication.

Changes at William Penn Airport

H. WILSON ORR, JR., manager of the William Penn Airport, Philadelphia, Pa., has announced changes in the field personnel. Earl E. Bach, formerly of the Rising Sun and Flying Dutchman airports, has been made chief pilot and instructor. Orris Firth has also been added to the flying staff.

Following the lead of other air fields in the vicinity, the buildings at William Penn Airport have been painted black and silver, to make them readily discernible from the air.

Texas Town Acquires Airport Site

THE NACOGDOCHES (Tex.) Chamber of Commerce aviation committee, working in cooperation with the City Commission of Nacogdoches, has closed a deal for a 130-acre tract of land situated on the Spanish Bluff road five miles southwest of the town. Arrangements will be made for the operation and maintenance of an airport on this tract

Thirty Emergency Fields Discontinued

FOR REASONS of economy about thirty Department of Commerce inter-

mediate emergency fields have been discontinued and the course lights altered to red from green. Many course lights and beacons have been moved to new locations. On several airway routes all the beacons and ground lights on intermediate fields are extinguished after the last scheduled mail or transport trip.

Mississippi Airport Is Dedicated

ULMER FIELD at Brookhaven, Miss., completed at a cost of about \$16,000, was dedicated recently. The airport is equipped with lights and will be used as an emergency field by American Airways. The field is named in honor of J. R. Ulmer, Brookhaven business man.

Tennessee Field Is Opened

THE AIRPORT at Savannah, Tenn., was dedicated recently. The field has been named William-Watson Airport.

Nevada Airport Under Construction

WORK on the first airport at Boulder City, Nev., was reported to be rapidly progressing recently with the grading of three 4,000-foot runways. A four-plane hangar with complete machine shop was being erected. The concession was awarded to Noel Bullock, of Los Angeles, Calif., who will conduct a training school. The port, however, will be public.

Walla Walla Airport Head Appointed

KARL BAUMEISTER, ex-Army flier, has been named manager of the municipal airport at Walla Walla, Wash., succeeding Ralph Gibbons, who has joined United Air Lines at Portland, Ore.

Ohio Airport Group Organized

THE PIONEER CITY Flying Service has been formed by Marietta, Ohio, men, who will take charge of the municipal airport at Gravel Bank. Bernard Covery has been named chief pilot. A flying school will be established.

Air Service Station Established

AN AERONAUTICAL service station has been established by the Gulf Refining Co. near Hicksville, Long Island, N. Y. A large, flat field has been secured and marked and is now open to professional and amateur fliers. Under the direction of Capt. Al Williams, noted flier and manager of aviation sales for the Gulf Refining Co., the service station has been plainly airmarked as "Gulf Air Service Station." The current price of gasoline appears beside the station designation.

Texas Field to be Opened

CENTER, TEX., is to have a landing field of about 200 acres in area, it was announced recently. The field will have a north-south runway of 1500 feet and an east-west runway of more than 2500 feet.

Fred Denstow Heads United Airports

SUCCEEDING P. G. Johnson, who has resigned, Fred Denstow, vice president and general manager of United Airports of California, Ltd., has been chosen president of that corporation. Actively in charge since the airport's establishment in 1930, Mr. Denstow is credited with a great part of the development of United Airport, Burbank, Calif. The company is capitalized at \$2,500,000, more than \$2,000,000 of which is invested in real estate, terminal buildings, hangars, paved runways and other permanent airport equipment.

Love Field to Have New Superintendent

SUPERVISION of Love Field, Dallas, Tex., municipal airport, will be placed under David L. Robinson, Jr., when the new city budget goes into effect October 1, it is reported. Mr. Robinson's new duties will be in addition to his work with the city planning commission and his position as assistant city manager.

Neumann Wins Louisville Feature

HAROLD NEUMANN placed first in the featured event at the Louisville, Ky., air races August 20. Jack Wright and Clarence McArthur, respectively, finished second and third in the race, which was flown over a twenty-five-mile distance in planes powered with engines of 500 cu. in. displacement.

Washington-Hoover Field United Again

HOOVER AIRPORT, South Washington, Va., after being sold at auction July 31 to Ludington Securities, Inc., for \$174,500, was reported to have been purchased by National Aviation. The latter company earlier in the month had bought Washington Airport, across Military Road from the Hoover Airport section. Hoover Airport, to which National Airport Corp., a subsidiary of National Aviation, has acquired title, includes 37½ acres located between Military Road and the Potomac River at the south end of Highway Bridge.

Flying Service Located at Airport

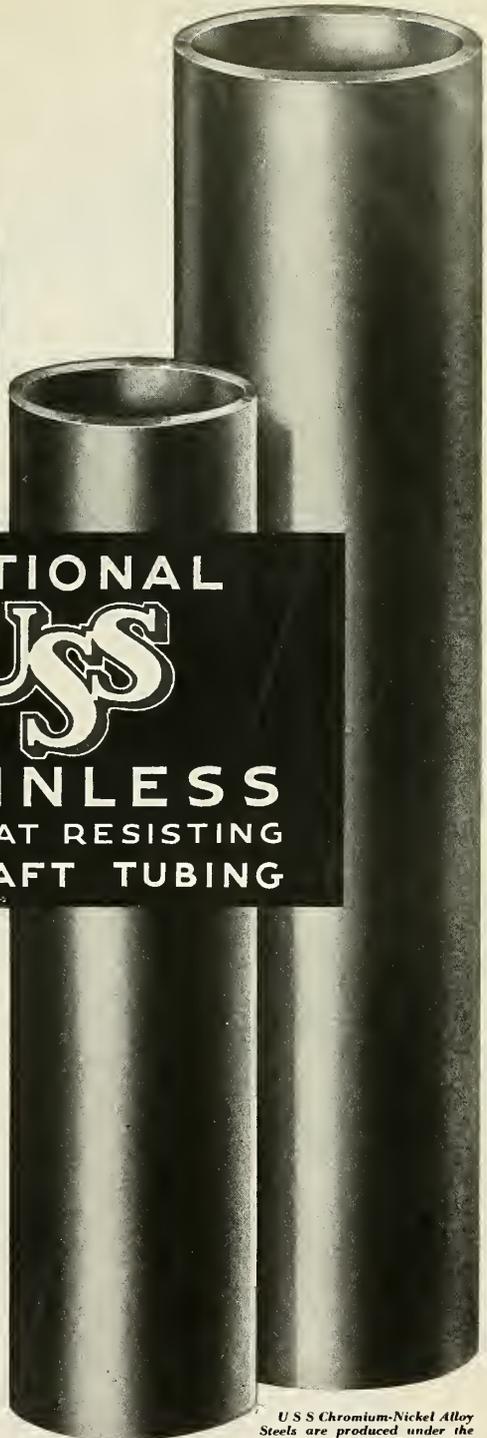
THE BOISE, Ida., air field will hereafter be the location of the Boise Flying Service, it was announced last month. The company has taken the field following cancellation of the lease of Bennett Air Transport Co.

Ailor Sells Three Planes in One Week

IN ONE WEEK recently Howard Ailor, president of Waco Sales at Roosevelt Field, N. Y., sold a de luxe Waco cabin plane to the Ethyl Corp. of New York, N. Y.; a Waco F-2 to George Ruffe, New York cartoonist, and a Waco F-2 to L. G. Parsons of Birmingham, Ala.

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Tubing at
its best!**

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For many uses in aircraft construction, NATIONAL U S S 18-8 Stainless and Heat Resisting Aircraft Tubing introduces new measures of economy and of safety. High resistance to corrosion and to injurious effects of temperature are combined with great strength and unusual uniformity. This chromium-nickel alloy seamless tubing conforms fully to U. S. Army and U. S. Navy specifications and is made from the finest quality electric-furnace steel. NATIONAL engineers will gladly lend their aid in determining the best application of NATIONAL U S S 18-8 Stainless and Heat Resisting Aircraft Tubing to particular requirements. Descriptive literature will be supplied on request.

Visit the exhibits of the Subsidiary Manufacturing Companies of United States Steel Corporation, in the GENERAL EXHIBITS BUILDING—A CENTURY OF PROGRESS EXPOSITION, Chicago.

U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York, and Fried. Krupp A. G. of Germany.



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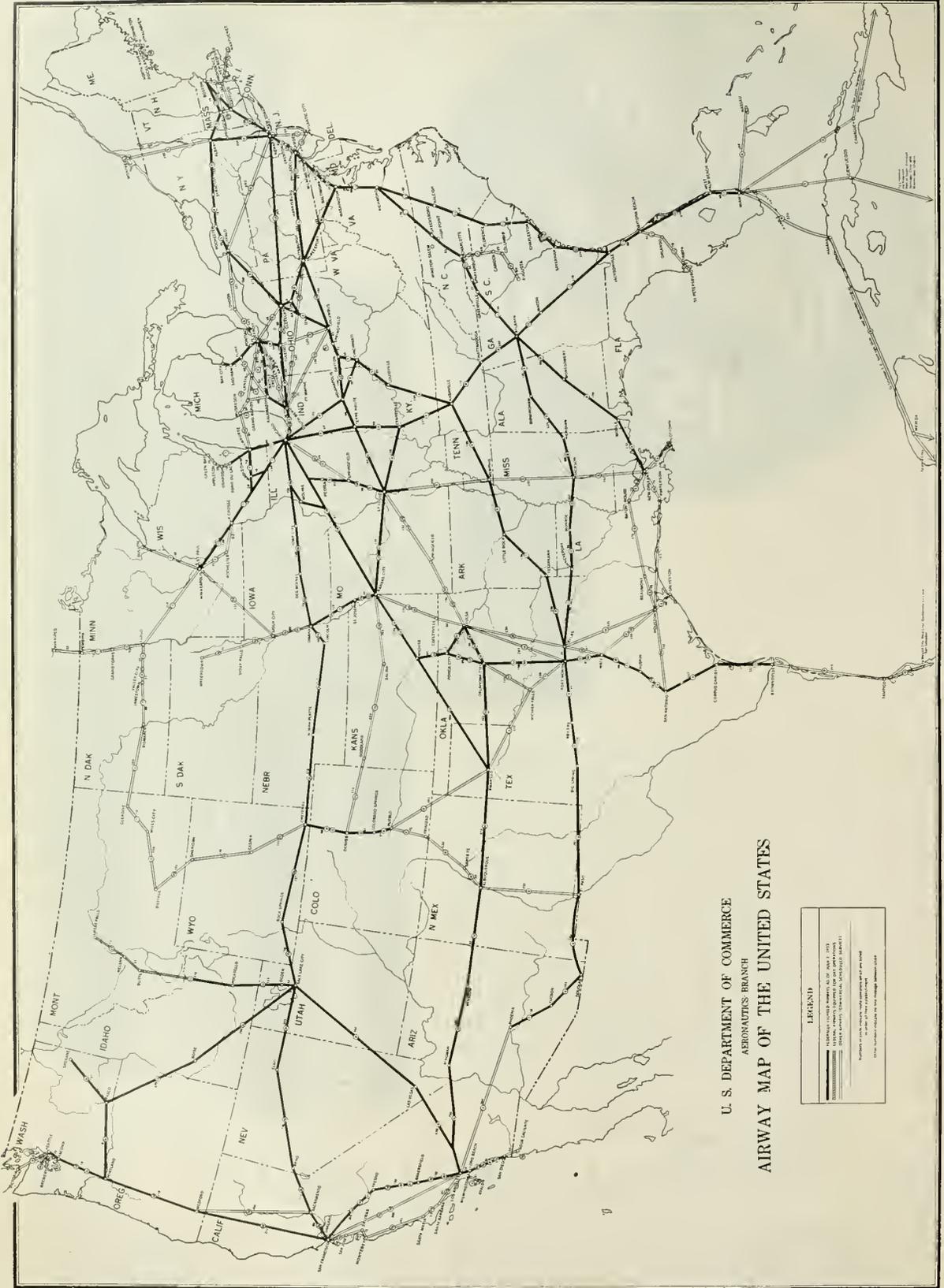
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Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif.

Export Distributors—United States Steel Products Company, 30 Church Street, New York, N. Y.



U. S. DEPARTMENT OF COMMERCE
 AERONAUTICS BRANCH
AIRWAY MAP OF THE UNITED STATES

AIRLINES and AIR TRAVEL

THE AIRWAY MAP on the opposite page and the list below show the scheduled airline operators in the United States, the routes operated and the class of service they render. Numbers in circles identify the route operators, listed in the order of their establishment. Other numbers show the mileage between cities.

Boston-Maine Airline Opens

REGULAR air passenger service from Boston, Mass., to Portland, Rockland, Waterville and Bangor, Me., was opened August 11 by National Airways, Inc., operating for Boston-Maine Airways, aviation subsidiary of the Boston and Maine and Maine Central railroads. Five daily round trips between Boston and Portland and two trips between Boston and Bangor are scheduled, and reduced fares are featured. Stinson trimotors are being used. Officials of National Airways, Inc., include Amelia Earhart Putnam and Paul F. Collins, who was formerly with Ludington Air Lines.

a maximum of 150 hours of flying monthly; cabin attendants, a minimum rate of \$100 and 150 hours maximum; shop mechanics, a minimum rate of 40 cents an hour and an average of 40 hours a week for 52 weeks, with a maximum of 48 hours in any one week; clerks, a minimum of \$15 a week and a maximum of 40 hours a week; outside salesmen, a minimum of \$100 a month and a maximum of 48 hours a week; radio operators, service mechanics and field clerks, a minimum of \$80 a month with no stipulation as to hours because of the intermittent nature of the work and active duty; apprentices, washers, helpers, porters, office boys, janitors and watchmen, a minimum of 30 cents an hour with a maximum of 40 hours a week. The above provisions do not apply to persons employed in a professional, managerial or executive capacity who now receive more than \$35 a week, nor to employees on emergency operations or maintenance work.

Record Number of Passengers Carried

AIR TRAFFIC over routes of United Air Lines rose to a new high mark in July when 15,462 revenue passengers were carried. This is reported to be the largest number of passengers ever carried by any airline in a single month.

The air transport code bars employment of persons aged under 16. Selection, retention and advancement of employees will be on the basis of individual merit without regard to their affiliation or non-affiliation with any organization. Members of the code agree not to initiate service between cities already served by another member over an identical route.

Air Transport Code Is Filed

THE AERONAUTICAL Chamber of Commerce of America, Inc., including in its membership the major companies aggregating 90 per cent of the scheduled flying operations of all American lines, filed its air transport code last month. The code was prepared by the code committee, which has the same membership as the board of governors of the chamber, and with the approval of its air transport section.

Flying Miners in Alaska

UNUSUAL INCREASE in airplane transportation in Alaska has been reported in Seattle, Wash., by L. W. Lee, of the Pacific Alaska Airways, Inc. Mr. Lee pointed out that mining parties of from six to twelve charter planes with growing frequency, fly to secret destinations for their diggings, and then fix a date before they become snowbound for the pilot to pick them up. In case of emergency, they have pre-arranged signals for pilots flying overhead. The Pacific Alaska Airways, Mr. Lee said, began last fall with twelve planes and is already feeling the need for more air vehicles, with miners and prospectors overtaxing the lines.

The air transport code provides monthly minimum pay and maximum hours of work for pilots at \$250 and 110 hours of flying, the pay minimum applying only to that kind of flying involving a minimum of responsibility and risk, such as air freight or charter services. Co-pilots are to have a minimum rate of \$150 and

Northrop Transport Tested for TWA

TEST FLIGHTS of the new Northrop Delta, whose cruising speed of 187 miles an hour will permit Transcontinental & Western Air to inaugurate a faster coast-to-coast service for passengers, mail and express, were being made recently in Los Angeles, Calif. Powered with a 700-horsepower Cyclone engine, the Northrop will have a gross wing loading of 7,000 pounds and a pay load of 2,000 pounds. Air brakes, or flaps, attached to the lower edge of the wing surface, reduce its landing speed to about fifty miles an hour.

Route No.	Operator	Routes Operated	MILEAGE	CLASS OF SERVICE
14	United Air Lines	Chicago to New York	717	MPE
	National Air Trans. Co.	Chicago to New York (via Wichita)	973	MPE
		Chicago to Dallas (via Tulsa)	913	MPE
		Tulsa to Ponca City	77	ME
15	Boeing Air Transport	San Francisco to Chicago	1930	MPE
		Omaha to Watertown	259	MPE
		Kansas City to Omaha	168	MPE
16	Varney Air Lines	San Jose to Seattle	847	MPE
		via Pasco and Portland	127	MPE
		Pasco to Spokane	1167	MPE
17	Pacific Air Transport	San Diego to Seattle	1621	MPE
		Oakland to San Jose	42	MPE
		Los Angeles to San Francisco	348	MPE
18	Seattle-Victoria Air Mail	Seattle to Victoria	74	MP
19	Wilmington Catalina Air Line	Wilmington to Avalon	31	PE
20	Johnson Airways	Plottown to New Orleans	74	M
21	American Airways	St. Louis to Chicago	257	MPE
		Nashville to Cincinnati	483	MPE
		Fort Worth to Nashville	658	MPE
		New Orleans to St. Louis	599	MPE
		Brownsville to Dallas	546	MPE
		Galveston to Dallas	318	MPE
		New Orleans to Atlanta	480	M
		Houston to New Orleans	319	M
		Atlanta to Los Angeles	2073	MPE
		via Dallas	623	M
		Atlanta to Chicago	145	M
		St. Louis to Knoxville	261	MPE
		Cincinnati to Chicago	261	MPE
		New York to Boston	192	MPE
		Columbus to Albany	446	ME
		New York to Montreal	332	MPE
		Dallas to Amarillo	445	MP
		Chicago to Muskogee	517	MPE
		Bay City to Pomona	263	MPE
		Chicago to Detroit (direct)	263	MPE
		Cleveland to Detroit (via Toledo)	152	MPE
		Columbus to Detroit	174	MPE
		Chicago to Detroit (direct)	93	MPE
		New York to Chicago	781	PE
		via Buffalo and Detroit	702	MPE
22	Western Air Express	San Diego to Salt Lake City	702	MPE
		Pueblo to Cheyenne	199	MPE
		Amarillo to Pueblo	261	MP
		El Paso to Pueblo	452	MP
23	Northwest Airways	Milwaukee to Green Bay	120	MPE
		Chicago to St. Paul	405	MPE
		(via Milwaukee & Minneapolis)	405	MPE
		Chicago to St. Paul	375	MPE
		(via Rochester & Minneapolis)	375	MPE
		St. Paul to Pembina, N. D.	369	MPE
		St. Paul to Duluth	145	MPE
		Fargo to Bismarck	580	MPE
24	Pennsylvania Air Lines	Washington to Cleveland	317	MPE
25	Pan American Airways	Miami to Havana	229	MPE
		via Florida Keys	1180	MPE
		Miami to San Juan	729	MPE
		San Juan to Paramaribo	1378	MPE
		Dutch Guiana	1378	MPE
		Buenos Aires to Paramaribo	4840	MP
		Miami to Nassau	168	MPE
		Miami to Cristobal	2228	MP
		(via San Salvador)	1810	MP
		Cristobal to Miami (via Kingston and Barranquilla)	1810	MP
		Barranquilla to Port Spain	1021	MP
		Brownsville to Mexico City	446	MP
		(via Tampico)	446	MP
		Brownsville to San Salvador	1087	MP
26	Transcontinental and Western Air	Los Angeles to New York	2567	MPE
		via Kansas City	1098	MPE
		Amarillo to Columbus	277	P
		via Tulsa	1078	MPE
		Columbus to Chicago	277	P
		Los Angeles to San Francisco	372	P
27	Eastern Air Transport	Atlanta to New York	786	MP
		Miami to Atlanta	620	MP
		St. Petersburg to Daytona Beach	147	MP
		St. Petersburg to Richmond (via Charleston)	571	MP
		Atlantic City to New York	97	MP
		Atlantic City to Philadelphia	57	PE
		Augusta to Charlotte	163	MPE
28	National Parks Airways	Salt Lake to Great Falls, Mont.	483	MPE
29	Pan American Grace Airways	Cristobal, C. Z., to Montevideo, Uruguay (via Santiago Chile)	4552	MP
30	Gorst Air Transport	Seattle to Bremerton	15	P
31	United States Airways	Kansas City to Denver	577	MPE
		(via Salina)	577	MPE
32	Kohler Aviation Corp.	Milwaukee to Grand Rapids	119	MP
		Detroit to Grand Rapids	140	MPE
33	Rapid Air Transport	St. Louis to Omaha	406	P
		(via Kansas City)	406	P
34	Bowen Air Lines	Dallas-Fort Worth to Oklahoma City	218	P
		Fort Worth to Dallas to Tulsa	269	P
		San Antonio to Fort Worth	281	P
		Houston to Fort Worth	255	P
35	Branch Airways	Oklahoma City to Chicago	624	P
		via Kansas City	724	P
		Tulsa to Chicago	615	P
		via St. Louis	724	P
36	Gipon Airlines	Aqua Caliente to Los Angeles	130	P
		via San Diego	130	P
37	Wyoming Air Service	Denver to Billings	476	P
38	Reed Airline	Wichita Falls to Ponca City	213	P
39	Varney Speed Lines	San Diego to San Francisco	462	P
40	Hanford Tri-State Air Lines	Omaha to St. Paul	328	P
41	Commuters Air Service	Hartford to Springfield	24	P
42	Wedell-Williams Air Service	San Antonio to New Orleans	509	P
43	Cardiff and Peacock	Los Angeles to San Francisco	372	P
44	Maine Air Transport	New Bedford to Nantucket	50	P
		Rockland to Stonington	30	P
45	Pacific Seaboard Air Lines	Los Angeles to San Francisco	387	P



L. F. Whittemore, assistant to the president, Boston & Maine R. R., and Amelia Earhart

January-June Airline Traffic

SCHEDULED AIRLINES operating in continental United States carried 195,874 passengers during the first six months of 1933, according to the Aeronautics Branch of the Department of Commerce.

A comparison of the months of June in the two years shows an increase from 46,639 passengers carried in June, 1932, to 54,023 in June, 1933. Comparisons of the six-month periods show increases in 1933 over the corresponding period in 1932 with respect to express carried, miles flown and passenger miles flown. The increase in total passenger miles, despite a reduction for the six months in the number of passengers carried, indicates that passengers made longer flights in 1933 than in 1932. During June, 1933, the twenty-six reporting companies flew 4,336,303 miles and 18,831,162 passenger miles and carried 135,266 pounds of express.

Only domestic airline operations are included in this report. The domestic lines flew 22,904,511 miles and 64,382,359 passenger miles and carried 650,875 pounds of express during the first six months of 1933.

Airways' Economy Conference Held

PROPOSALS of the Department of Commerce to reduce the cost of maintaining certain of the air navigation aids on the Federal airways system were discussed at a conference between the Aeronautics Branch and representatives of users of the airways, on August 15 in Washington, D. C. The meeting was called by the Department of Commerce for the purpose of affording those who use the airways an opportunity to present their views as to the proposed curtailments which have become necessary because of reduced appropriations for the fiscal year 1934.

The proposals included: Consolidation of certain routes; rearrangement of lenses in the double-ended 36-inch rotating beacons so as to provide alternate white and colored flashes and eliminate

the necessity for course lights; a new arrangement of lamp bulbs and cover glasses in 24-inch rotating beacons; turning off of boundary lights at intermediate landing fields having keeper personnel, and turning them on upon request; operation of radio range beacons only when ceiling and visibility approach specified minimums; discontinuance of 1,419 miles of lighting; rearrangement of teletype circuits, and operation of revolving beacons on a scheduled operations basis.

No final decisions of any kind were made as to the disposition of the Department's proposals. The suggestions and views of those present are to be taken into consideration by the Department before action is taken. The representatives were invited to present any further views which might occur to them in writing to the Department before the last of August, when a decision was to be made as to how the necessary economies are to be effected.

Thaden Now With TWA at Kansas City

HERBERT V. THADEN, former chief engineer and factory manager of the General Aviation Manufacturing Corp., Baltimore, Md., has been transferred to a special engineering assignment with Transcontinental & Western Air, Inc., at Kansas City. Mr. Thaden will maintain offices at the operations headquarters and maintenance base of TWA at Kansas City, and his work will pertain to the close coordination of manufacturing and operating activities of the General Motor affiliates.

United Speeds Service to Southwest

AIR MAIL-passenger-express service from Chicago to Kansas City, Tulsa, Oklahoma City, Wichita, Fort Worth, Dallas and other points in the Southwest was speeded up last month when United Air Lines placed in effect new schedules with Boeing Wasp-powered high-speed monoplanes similar to the equipment it has been operating on coast-to-coast schedules since June.

Airway Beacon Light Changes

A SAVING of approximately \$75,000 a year in the cost of operating airway rotating beacon lights on the Federal airways throughout the United States will be effected by the Department of Commerce by reducing the wattage of the lamps fifty per cent and substituting clear cover glasses for the current prismatic type, it was announced last month by Rex Martin, Director of Airways of the Department. The substitution of a clear cover glass will maintain the useful candlepower at only a comparatively small amount below its regular level, although the strength of the lamp will be reduced to a greater degree.

Madison Added as Main-Line Stop

NORTHWEST AIRWAYS has announced that Madison, Wis., has now become a regular stop on the line's 8:30 a. m. departure out of Chicago for Milwaukee and the Twin Cities and on its 3:15 p. m. departure out of the Twin Cities for Chicago. This gives Madison main-line Ford trimotor services, the planes carrying thirteen passengers and two pilots. Madison was formerly served by the branch line operated between Chicago, Rockford and Janesville.

Airline Increases Free Baggage Limit

NORTHWEST AIRWAYS, INC., has increased its free baggage limit from thirty to forty pounds.

Due to an increase in business, on the night run of the airline between St. Paul, Minn., and Chicago, the Hamilton planes have been replaced by Fords.

The 4 p. m. departure from Chicago has been changed to 4:30, and the 12:50 departure to 2 a. m., in order to make direct connections with planes from the East and West.

Plane Designed for Airline Executive

A SPECIAL biplane has been designed and reconstructed by the technical and mechanical staff of Northwest Airways, Inc., for the use of Fred W. Whittemore, operations manager. This ship is designed for experimental work as well as for facilitating the transportation of Mr. Whittemore over the airline's territory.

When tests are completed, the plane is expected to have a speed of over 200 miles per hour. Equipment used includes aluminum gas tanks, specially constructed light-type aircraft battery, specially designed wheel pants, chamfered wing butts, convertible front cockpit with knock-down windshield for mechanic or emergency use, oil-cooling radiator, apparatus for instrument flying, high-wave radio receivers, Elgin flares, Wright J-6 300-horsepower engine and special N. A. C. A. cowling with 30-inch skirt.

(Continued on following page)



Biplane reconstructed by Northwest Airways staff for operations manager of the airline

REPEAT ORDERS

for the New CURTISS-WRIGHT CONDOR



Eastern Air Transport recently established a 95-Minute Express Service, between New York and Washington, with new Curtiss-Wright Condors.

American Airways has inaugurated a high-speed service between Chicago and New York—via Detroit and Buffalo—reducing the flying time to a little more than 5½ hours.



REPPEAT orders for the new Curtiss-Wright Condor indicate how well this luxurious transport meets the advanced requirements of airline operators. American Airways and Eastern Air Transport have placed additional orders totaling double the number of planes originally purchased.

Public acceptance of the new Condor has been enthusiastically demonstrated by the fact that since these new transports have been placed in scheduled service on American Airways and Eastern Air Transport, they have been filled to capacity.

The new Curtiss-Wright Condor's unusually quiet cabin; its luxurious equipment for passenger comfort; its speed, combined with economy of operation, are characteristics which have made the Condor the outstanding transport of 1933.

The payload of the new Curtiss-Wright Condor normally consists of 3200 lbs.—15 passengers, 450 lbs. of baggage or express and 200 lbs. of mail. From the standpoint of economy, it has the lowest operating cost, per seat-mile, of any multi-engine transport now in service operation.

CURTISS-WRIGHT AIRPLANE COMPANY

ROBERTSON, MISSOURI

A DIVISION OF CURTISS-WRIGHT CORPORATION

(Continued from preceding page)

General Air Express Has Anniversary

MORE THAN 550,000 pounds of air express was carried by General Air Express over its member airlines during the first year of operation, ended August 8, according to Stephen F. Christy, general secretary. This is an increase of more than 222 per cent over the previous year, during which American Airways, Eastern Air Transport, Pennsylvania Airlines, Transcontinental & Western Air and United States Airways carried air express individually and before these lines became associated in General Air Express for the interline movement of air packages. Since the National Industrial Recovery Act has been in effect, member lines of General Air Express have reported sharp increases in the number of air shipments, particularly from New York, Boston, Chicago, Detroit, San Francisco and Los Angeles.

Reductions in Air Express Rates

ROGER M. COMBS, JR., chairman of General Air Express, has announced lowering of air express rates ranging up to twenty per cent. Participating airlines include American Airways, Eastern Air Transport, Pennsylvania Air Lines, United States Airways and Transcontinental & Western Air.

Pan American Surveys Pacific Airway

RECOMMENDATION of the immediate institution of a weekly air service between Hongkong, China, and Manila, in the Philippines, was reported last month by H. M. Bixby, who headed a survey group for Pan American Airways on an investigation flight. Mr. Bixby, William Ehmer and W. S. Grooch flew in a Sikorsky amphibion from Shanghai to Manila August 14-16 to find out the possibilities of a regular air service in that section. The proposed airline would be part of a system of airways in the Far East to be eventually linked with a trans-Pacific airline, it was stated.

TWA Announces New Schedule

The "BLUE RIBBON" air mail schedule was introduced on the coast-to-coast airways last month when Transcontinental & Western Air, Inc., inaugurated a one-stop air mail service between

the Middle West and the Pacific Coast, cutting another forty minutes from the time required for a letter to cross the continent. At the same time, fifty minutes were cut from the time required for passengers and mail to fly from New York to Los Angeles on the mid-transcontinental route via Kansas City.

Elimination of three stops on the former air mail schedules, leaving Albuquerque, New Mexico, as the only stop between Kansas City and Los Angeles, brought about the air mail time reduction and assured arrival of letters in Los Angeles for the first morning delivery. The reduction in passenger time was made possible by a rearrangement of schedules so that passengers on the "Sky Chief" of TWA now arrive in Los Angeles at 9:48 a. m.

Reports Required on Forced Landings

ALL FORCED LANDINGS of interstate scheduled air passenger transport craft caused by mechanical trouble or bad weather hereafter will be reported to the Aeronautics Branch of the Department of Commerce and will be subjected to the same careful scrutiny that now is given to reports of accidents, Assistant Secretary of Commerce Ewing Y. Mitchell announced last month. The information will enable the Department of Commerce to reduce further the number of accidents in scheduled air passenger operations by providing more comprehensive data with respect to conditions which might result in accidents. In the past, air passenger lines have been requested to report only the number of forced landings due to mechanical trouble and bad weather without giving details.

Western Airline Extends Service

NATIONAL PARKS AIRWAYS, INC., has opened a 210-mile extension from Butte to Billings, Mont., via Livingston. With this addition, the Railway express Agency, Inc., has increased its air-express mileage to 12,868, it was announced last month. The connecting air-express link provides one route from Chicago to Billings via Milwaukee, the Twin Cities, Fargo and Bismarck, N. D., via the Northwest Airways, and the other via the United Air Lines to Salt Lake City and thence via the National Parks Airways.

World's Fair Airline Radio Exhibition

A CONTINUOUS demonstration of how modern air transportation makes use of the radio telephone is one of the features of the United Air Lines' exhibit at A Century of Progress exposition in Chicago. In cooperation with the Western Electric Co., United has installed special equipment which reproduces typical calls between planes and ground stations and simultaneously explains their purpose.

The exhibit centers around one of the new Boeing transports, which is equipped with standard two-way radiophone apparatus and radio beacon receiver. Catwalks built around the plane enable visitors to inspect it at close range, and as they do so, a public address system employing eight loud speakers distributed around the plane gives them a complete description from a sound record. Seated in the cockpit are two life-like robot pilots, moving the wheel as though actually flying and wearing the earphones of their radiophone sets. Periodically the talk refers to the radiophone, and synchronized to the proper moment, the dummy pilot raises the microphone to his lips. As he does so, a typical position report as given by a pilot is heard. The three characteristic signals of the radio beacon also are reproduced, and finally a complete station-to-station sequence call, running from Cheyenne to Oakland on the coast-to-coast route, is heard.

Public Works Funds Help Airways

RELOCATION of lights on two airways and radio station improvements at about fifty cities will be undertaken as part of the Federal Government's public works program, it was announced last month. The two airways on which lights will be changed are the Omaha-Chicago and the New York-Boston routes.

Braniff Plane Makes Quick Flight

A FAST flight was reported to have been made recently by a transport plane operated by Braniff Airways from Kansas City to Tulsa, Okla. Luther R. Gray piloted the plane, which carried two passengers and covered 220 miles in fifty-seven minutes, at an average speed of 231 miles per hour.



ELIMINATE THE GUESSWORK — INSTALL A Westport

● Whether you fly for sport or business, your airplane is no better than your knowledge of where you are going and what kind of weather is ahead.

● More than 200 pilots rely on Westport to carry them through, and it never fails. More pilots are flying the "Westport way" every day.

● Once you fly by radio, you will never be satisfied to fly any other way. Just "climb on a beam" and ride it through. It is simple to do. You will find it the cheapest and surest "safety insurance" that you can ever buy.

PACIFIC AIRMOTIVE CORP., Ltd.

United Airport, Burbank, Calif. Oakland Airport, Oakland, Calif.

DAWN PATROL

FLY CROSS COUNTRY



**THE ONLY MILLION DOLLAR COMMERCIAL
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PART OF TWELVE PLANES OF THE DAWN PATROL ON A CROSS-COUNTRY FLIGHT. GUESTS OF THE CITY OF NEOSHO, MISSOURI

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HERE—at SPARTAN, theory gives way to actual flying conditions. You know **WHEN** to do a thing, and **HOW** to do it, by **ACTUAL DOING!** Every two weeks Spartan Students, members of the famed **DAWN PATROL** fly cross country on trips visiting many new airports and cities. Thus encountering the same problems that are a daily part of air line and private plane flying, you are taught to apply your instruction to actual conditions! **Guess-work is eliminated, but only the facilities of this MILLION DOLLAR organization make such instruction possible.** This training is the reason that *today's graduate of SPARTAN will to-*

morrow take his place among the GREATEST NAMES IN AVIATION.

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Transport Pilot's Flight and Ground Course	\$1,745.00
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THE AIR SERVICES

"Los Angeles" to Resume Service

THE NAVAL dirigible *Los Angeles*, which was retired from service at the end of June, 1932, is being prepared to resume active duty this autumn as a training ship, it is reported. It is expected that the *Los Angeles* will be stationed at Lakehurst, N. J., where she has been housed since her retirement and deflation last year.

Flying Police Make Two More Rescues

THE NEW YORK flying police added two more to their record of persons saved from drowning by rescuing two men near Coney Island July 29. Patrolmen Richard Ryan and Peter Terranova were cruising in a police amphibion above the island when they sighted two youths struggling in the water. Landing near the men, they tossed a life raft to them. When it became evident that the men were too weak to board the raft, Ryan dived from the plane and put the men on the raft, which the plane towed to land.

Army Cooperates in N. R. A. Campaign

THE ARMY AIR CORPS has been doing its bit toward making the N. R. A. campaign a success. As part of the movement, thirty-six Army planes, loaded with Blue Eagle placards and stickers took off from New York last month for various prominent eastern cities. Twenty-seven of the ships flew in formation over New York before separating for their several destinations.

General Hugh S. Johnson, National Recovery Administrator, has been making extensive use of the Army flying facilities in securing quick transportation to various parts of the country where his presence is needed in helping to solve the problems of the new economic system.

New Commandant at Floyd Bennett Base

LIEUT. ROBERT F. HICKEY, U. S. N., has taken over the command of the Naval Reserve Aviation Base at Floyd Bennett Field, Brooklyn, N. Y. He relieves Lieut. Frederic W. Priestman, of the Reserves, who remains as executive officer.

Lieut.-Comdr. Frank Hawks is now associated with VN4RD3 Naval Reserve Squadron based at the field and has adopted the base's insignia for use on his new plane.

Naval Inspection Tour Completed

TWELVE MEMBERS of an inspection tour of overhaul and maintenance of Naval aircraft recently concluded their national trip. Representatives from the Naval continental aircraft repair bases, from the Bureau of Aeronautics and from the Bureau of Supplies and Accounts formed the personnel of the tour. Army

Air Corps repair depots at San Diego, San Antonio, Dayton and Middletown and overhaul bases of several commercial airlines were visited.

Instrument Flying at Chanute Field

A RIGOROUS PROGRAM of instrument flight instruction has been instituted at Chanute Field, Rantoul, Ill., by Lieut.-Col. James A. Mars, commanding officer of the station. All pilots will receive a uniform ten-hour course in instrument flying, according to a recent communication from the Chief of the Air Corps.

Several 1933 officers' classes of the Air Corps Technical School at Chanute Field were graduated recently. The graduating classes include the Regular Army officers' classes in communications and in maintenance engineering, and the National Guard Air Reserve officers' classes in communications, maintenance engineering, armament and photography.

March Field to Have 100 New Planes

ACCORDING to word received from the Rockwell Air Depot, March Field, Riverside, Calif., is to be equipped with a new allotment of 100 tactical planes during the fiscal year 1934.

Ingalls Receives French Award

FORMER ASSISTANT Secretary of the Navy David S. Ingalls was recently decorated with the ribbon of the Legion of Honor by French Ambassador de Laboulaye. He was honored by the French Government for his record as a flier in the World War and for his services to aviation.

Air Corps Buys Condors

THE ARMY AIR CORPS has purchased two Curtiss-Wright Condors for administrative purposes. These ships, assigned to Washington, are of the same general type as the eighteen which have been sold to American Airways and Eastern Air Transport except for the seating arrangement.

Radio Practice by Indiana Guardsmen

THE SQUADRON officers' class, 113th Observation Squadron, Indiana National Guard, has a radio training table which consists of twelve individual stalls containing a key and headphones, and a central control station which, by its system of switches, can establish one large radio net or several smaller ones. Any stall or key may be connected with any other, so that practice may be had between any two stations, or several stations, or they all may work together as a large controlled net. The Communications Section under Lieutenant Zartman and Lieutenant Brown built and installed the table.

Navy Tests New Flying Boat

A TWIN-ENGINED monoplane flying boat with a cruising speed of 140 miles per hour was being tested for possible future use at Anacostia, D. C., by the Navy Department last month, it is reported. The engines are faired into the wing to increase the streamline effect of the plane, which was manufactured by the Consolidated Aircraft Corp. of Buffalo, N. Y., and is known as the Type P2-Y2. The ship is equipped with bombing apparatus and machine guns and is built to carry a pilot, navigator and two other persons.

Airplanes Participate in Sham War

AERONAUTICS played an important part in the recent military carnival staged at the Pimlico race track, Baltimore, Md., under the auspices of the 110th Field Artillery and the Junior League of Baltimore. Swooping over the crouching lines of infantry defending a replica of a French village, planes of the 104th Observation Squadron launched a battle when they dropped signal flares for the attack. As the attack developed, the planes of the 29th Aviation Division, under command of Maj. Charles Masson, played a game of hide-and-seek with two powerful searchlights.

Non-Commissioned Officers' Head Named

STAFF SGT. Clyde W. Kendrick of the 11th Observation Squadron, Texas National Guard, has been elected president of the Non-Commissioned Officers Club, 36th Division Aviation.

K-1 Returns to Lakehurst Duties

THE NON-RIGID airship K-1, which has been at the plant of the Goodyear-Zeppelin Corp., Akron, Ohio, arrived at the Naval Air Station, Lakehurst, N. J., August 10, under command of Lieut. Comdr. T. G. W. Settle. The airship, of 320,000-cubic-foot volume, will be operated from Lakehurst for training and experimental purposes. The envelope of the K-1 was originally built by the Goodyear Zeppelin Corp., and the car by the Naval Aircraft Factory, Philadelphia; the airship was assembled at Lakehurst. After being operated for training purposes for some time, the K-1 was sent to Akron for modifications and repairs.

Philippine Air Force Planned

AN AVIATION DEVELOPMENT program plan for the constabulary of the Philippines with an initial cost of \$625,000 was announced last month by the Governor-General, according to a news report. The program, which is expected to take three years, would include the formation of a constabulary air force, purchase of airplanes and establishment of landing fields, with a central airport at Manila.

Gen. BALBO'S ACHIEVEMENT



The world has been impressed by the manner in which General Balbo's mighty fleet has flown the future air lanes of the Atlantic Ocean with such machine-like precision. The Sperry Company takes pride in the fact that their instruments once again have contributed to the success of a long distance ocean flight.



Sperry Horizon



Directional Gyros

These Savoia-Marchetti seaplanes are each equipped with two Directional Gyros and a Sperry Horizon.



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BROOKLYN - NEW YORK



Objectives of the American Legion Aeronautics Commission

MAJOR J. CARROLL CONE

Assistant Director for Aeronautic Development,
Department of Commerce;

Member, American Legion Aeronautics Commission



● THE Aeronautics Commission of the American Legion is working for the establishment and maintenance of a sound national policy with respect to military aeronautics, and for the promotion of civil aeronautics as a necessary adjunct of national defense. The Commission is prepared to cooperate in these, and other endeavors looking toward progress in flying, with agencies connected with aeronautics, and has in operation a program for stimulating interest in flying through the local posts of the Legion, particularly the aviation posts.

Military and naval aeronautics naturally have a strong appeal for men who saw the air forces of the nation in operation during the World War.

The Aeronautics Commission has recommended that more attention be given to military aeronautics in this country. It recognizes the need for economy in government expenditures at the present time, but this situation is temporary. The need for adequate national defense is always present, and plans should be made immediately for further expansion as soon as Federal finances will permit.

Specific suggestions advanced by the Commission are that a study of military aviation be undertaken either by a Joint Congressional Commission or by a committee appointed by the President; that the study should embrace (a) a review of the accomplishments under the Five-Year Procurement Program, (b) an examination of the personnel needs of the Air Corps of the Army and the Aeronautics Bureau of the Navy, and (c) the condition of the aircraft industry as a source of supply.

The need for defense in the air has

been emphasized this summer by the magnificent accomplishments in ocean and world flying. Aircraft which have been developed to such a high level of efficiency would be dangerous weapons in a national emergency. In any well-rounded scheme of national defense, the United States will have to take into account the possibility of invasion by formidable aerial attackers.

The military and naval forces constitute a first line of air defense which is backed up by National Guard and Reserve aviation. Beyond this there is a substantial reserve strength in civil aeronautics.

Civil aeronautics in this country is comprised of three major classifications: Scheduled air transportation, miscellaneous flying operations and manufacturing.

Every phase of civil aeronautics has significance in this country's plans for national defense. The pilots, mechanics and other trained personnel of the industry would be available for any service to which their country might call them in mobilizing air defense forces. The airlines would offer means of speedy communication and transportation. Craft used by miscellaneous operators could not be converted into military weapons, except in exceptional cases, but these airplanes could be drafted for training and transport work. The manufacturing plants are equipped to undertake production of any types needed by the Army and Navy.

The reserve strength represented by the civil aeronautics industry is vast. If this fact is widely recognized, and plans made for coordination of all phases, the

nation will be in a position to take advantage of this reserve whenever it is needed.

Accomplishment of this purpose is one of the objectives of the American Legion Aeronautics Commission. The Commission seeks to further in any way possible the advance of civil aeronautics both for the sake of the many advantages it offers in peace time for civilian pursuits and to enhance its value as a military reserve.

California Model Airplane Meet

MORE THAN 100 contestants competed in the model airplane meet at Pasadena, Calif., held in conjunction with the Department Convention of the American Legion of California, August 15. Winners in the various classes included: Commercial (seniors), Ira J. Hassard, Howard Broughton and Donald Miller; (juniors), Oliver Rouillard, Angelo Romito and Bob Harmon; stick, Howard Jenkins, Dennis Fisher and Louis Shock; speed, Floyd Erickson, Louis Shock and Frank Rogers.

Norman "Pat" Lyon of Los Angeles, vice-chairman of the Legion National Aeronautics Commission, was the supervising liaison official on the rules of the meet as set forth by the commission.

Air Show at Marshall, Texas

TOM FLAHERTY of Little Rock, Ark., was featured in stunting exhibitions at a meet at the Marshall, Tex., airport August 6. The celebration was handled by J. O. Womack of the Marshall airport under the auspices of the American Legion post at Marshall. Among the other events were two races, a parachute jump by H. A. Thomas, Jr., of Little Rock, a bomb-dropping contest and formation flying and maneuvers by six Army planes from Barksdale Field.

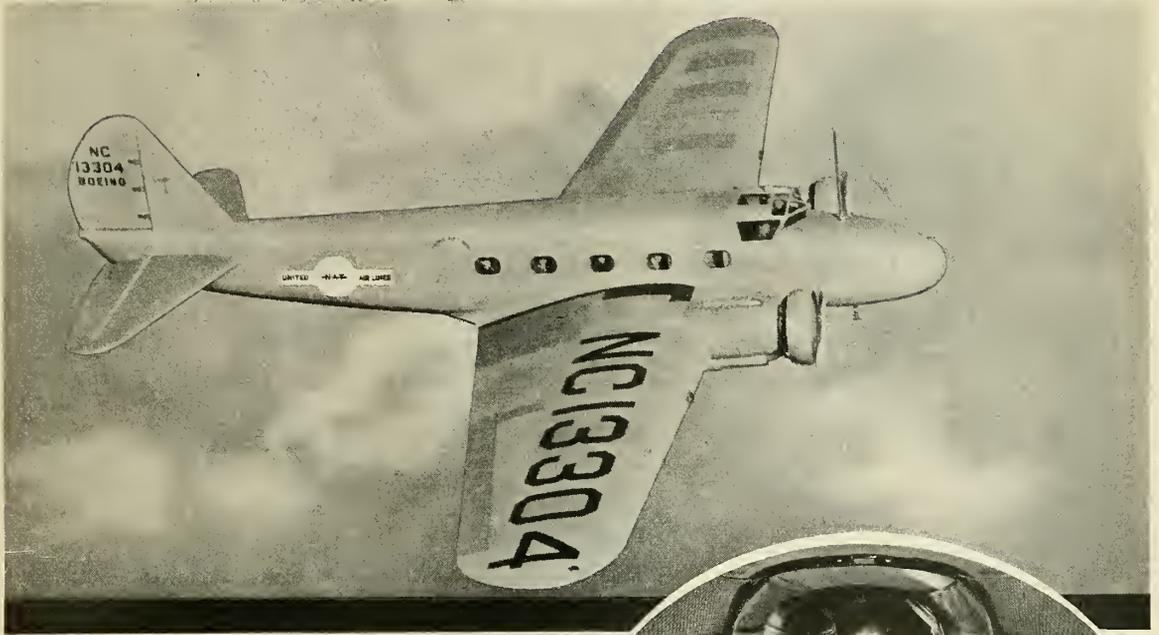
Maryland Legion Air Show

THE RECENT air circus at Easton, Md., held under the sponsorship of the Talbot Post, American Legion, was witnessed by over 15,000 persons. Among the events were a twenty-five-mile speed race, a bomb-dropping contest, a balloon-bursting competition, a parachute jump, an aerobatic demonstration and a free-for-all. Col. William D. Tipton, manager of the Curtiss-Wright Airport, Baltimore, was chairman of the arrangements committee. Members of the Camber Club of Baltimore and other participants were feted by the Legionnaires during their two-day stay at Easton.

National Contest at Indianapolis

The First Annual National Model Airplane Contest of The American Legion is to be held September 30 and October 1 at Indianapolis, Ind., instead of Chicago, Ill.

Club Car COMFORT AT 171 M.P.H.!



THE Boeing 247 is more than just a passenger-cargo transport! It is the "Club Car of the Air" — offering de luxe air travel comfort with maximum speed. In the commodious cabin are wide, deeply upholstered chairs generously spaced to allow ample leg room. Beside each is a window, reading lamp, ash tray and service button. A heating system, main and individual ventilators and cabin insulation insure an even, comfortable temperature regardless of outside conditions. At the same time vibration and noise have been substantially minimized. . . . It is the combination of "Club Car Comfort" with high performance, exceptional strength, large payload and operating economy

which makes the Boeing 247 "tomorrow's transport today!" Write for detailed specifications. . . . Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



BOEING *has always built tomorrow's airplanes today!*



PERSONALITIES

HALLEY'S COMET went by in 1910 and Ben O. Howard whizzed past the spectators at the National Air Races, Chicago, in 1930. Both events were equally startling. In fact, I had expected Halley's Comet, but the comet-like Howard was a complete surprise to me. Neither before nor since has there been such a popular racing combination as Bennie and "Pete," the little white plane with the Gipsy engine, in which he won five first places and finished third in the Thompson Trophy with a speed of 162.80 m.p.h. Since then many pilots have flown faster; but none has created the sensation that Ben O. (just plain Oh) Howard created at Chicago in 1930. That was the high point of his life; everything since then has been a stepping down from that climactic period of his career—until he finally got married, and that was the end of him as a speed demon.

He is now, as he has been since 1930, a hard working pilot for N. A. T. between Kansas City and Chicago. Airlines, as you know, frown upon their pilots entering races, so Bennie must content himself with entering his plane and having Roy Minor fly it, as he did at Los Angeles this year. Under Roy's guidance the Howard D.G.A. 5 with a Menasco B6 won five first places, two seconds, and one third, making speeds up to 197 m.p.h. in the closed course events and 241 m.p.h. in the Shell Speed Dash.

His ship won \$6,925 prize money, next to the highest amount, won by the Wedell-Williams Air Service, \$13,400. That must have cheered Ben a great deal and sweetened his outlook on racing, which rather soured on him last year. You see, Ben entered a period of prosperity with "Pete," which paid for itself four times over; and then, greatly elated, he built "Mike" and "Ike," only to learn that he had overjudged his cash prize market. He was so annoyed about it that he went around at Cleveland in 1932 and bit pieces out of the grandstand and Cliff Henderson. There's one thing you can count on at National Air Races: there's always a good snappy fight about something or other. It's only put on to add interest to the sport of racing and to keep us limber. When all else fails, Ray Brown shadow-boxes with Jack Berry, or Roscoe Turner misses a pylon and hits the Contest Committee. But it's all in a spirit of good clean fun.

by Caldwell

Ben Howard was born in Palestine, Texas, Feb. 4, 1904, and despite his best efforts to avoid any education whatever was held in school long enough to finish half a term in high school, when he leaped clear of all guidance and attached himself to a soda fountain. They paid him too much money, for one week he had \$10 saved and bought a Standard for the ten, promising to pay another ten every week for fifteen weeks. Well, next day he sent word from the hospital that the former owner could have the wreckage of the craft. Ben had taken



Bennie Howard in 1927

it up with enthusiasm, and nothing else. He spent a hot summer in a plaster cast, which is an uncomfortable way to spend a hot summer in Texas.

When the 17-year-old flying enthusiast was able to hobble around again, it was that fine gentleman, the late R. W. Mackie, who gave him some needed flying lessons in return for mechanical work. This was in Houston in the winter of 1922, after which Ben flew a year for C. C. Cannon, an oil operator with drilling operations scattered all over south Texas. He paid for the Standard he had used up, went to Nicholas Beazley in the summer of 1924 and then back to Houston to build his first ship, D. G. A. 1. "Mike" and "Ike" are D. G. A. 4 and 5. I wonder if the Department of Commerce guesses what D. G. A. stands for. The answer is Damned Good Airplane!

In the spring of 1926 Ben joined J. Don Alexander at Denver, where he stayed two years, was fired twice, and went to Dearborn to insert rivets in Fords for a month, then joined Robertson Air Lines in St. Louis to fly J 5 Fords on the Chicago run. Next spring he was fired by his dear friend, Bud Gurney, and went to work for T. A. T., which was just starting. By Christmas he was fired for reasons that seemed adequate to Dog Collins, even if they didn't to Ben, so he went to work for Universal, flying mail back and forth between St. Louis and Omaha in Pitcairns and Stearmans, and mail and passengers from Chicago to Tulsa in F 10's, until he told his boss, Bob Rentz, a few truths, and got fired in September, 1930. In November he was working for N. A. T., in time to be canned in December because they shut down the Stout Airlines. For a couple of months he rebuilt "Pete" and then went to work for Bill Bliss, in person, for Century Airlines, but was offered his job back with N. A. T., so returned to that company, where he has been ever since, flying between Kansas City and Chicago. He is careful not to get fired from N. A. T. because he is running out of airlines. Besides, he's married now and settled down. Probably the sensible thing to do will be to stay on the airline, and shuttle back and forth between Kansas City and Chicago until he finally wears out. We all wear out at something or other—usually something we don't care especially about. In Ben Howard's case he has an undoubted genius for designing racing planes—and I hope he designs a dozen more of that interesting series known as D.G.A.



WELL, BOYS, I've been out gunning for a celebrity to add a little tone to this undistinguished department, and over at Casey Jones School of Aeronautics in Newark, N. J., I shot down Lt.-Col. George A. Vaughn, Jr., the second ranking American Ace still surviving from the World War. During his period at the Front, while he was making America safe for Democratic Postmasters, he shot down twelve enemy aircraft and one balloon, according to official count, and received the British Distinguished Flying Cross, the Distinguished Service Cross

of the United States and two citations. The D. F. C. was presented shortly after the war by the Prince of Wales on *H. M. S. Renown* while he was visiting this country, and the D. S. C. came in the mail. Our Congressmen were all too busy squabbling with each other to take time off to pin the medal on the Colonel. The Prince wasn't so busy; but then, he isn't a Congressman.

George Vaughn, who you'd never suspect was a fighter to look at him, for he appears as mild and harmless as a Y. M. C. A. secretary, was born in Brooklyn, N. Y., in 1897. Brooklyn is



George Vaughn

the place where New Yorkers go to have a quiet night's sleep. You cross the Brooklyn Bridge, change to the horse cars, and there you are right out in the rural regions, surrounded by market gardens, dairy farms and Boss McCooey. It's all

very peaceful and repressed.

George Vaughn grew up in those peaceful vales, was educated at Adelphi Academy, and in 1915 entered Princeton University. He joined a group of aviation enthusiasts who formed an aviation club that in the early stages of the war leased a small field, bought a couple of Jennies and proceeded to take flying lessons. By June, 1917, all of the fifteen members had soloed the Jennies once each. Some of the alumni had a ground school established at Princeton, and the club group became the first class, graduating six weeks later as full-fledged privates, first class, in the Aviation Section of the Signal Corps, all ready to be sent abroad for the completion of their flying training.

With the graduates of other ground schools, this group started off for Italy, known as the Italian Detachment of 150 pilots who formed the background for "War Birds," the diary since made famous by Elliott White Springs, who was sergeant of the Princeton outfit. Instead of Italy, however, they landed in England, and went through another ground school course at Oxford University, apparently to give them the correct accent and to discourage a few who still were eating with their knives and leaving their spoons in the cups. The social amenities repaired, and the knack of carrying a cane without tripping over it mastered, the lads took additional flying training in England, attached to the Royal Flying Corps at Stanford, Shoreham, Hounslow and Ayre in Scotland.

George Vaughn finished his training with a few weeks of ferry duty, flying new ships from England to France for

the service squadrons, and got to the Front in May, 1918, attached to the 84th Squadron, Royal Air Force, flying SE 5's. In August, 1918, he was transferred to the 17th Squadron, A. E. F., as a flight commander. The squadron was operating on the British front at that time with Sopwith Camels—the American automobile factories having distinguished themselves by their inability to turn out any American fighting planes whatever. It was therefore on British or French machines that American pilots did all of their fighting. Not a single American plane went over the lines until after the Armistice. And even then they had a man walking ahead of it with a red flag. Just goes to show that if you want airplanes in wartime you have to support an aviation industry in peacetime—not turn the building of pursuit ships over to a factory that made kiddie cars or velocipedes before the war.

Back to America with his part in the war so efficiently concluded came the bold air fighter, spent a year finishing his education at Princeton and then went to work in the research laboratories of Western Electric Co. Soon he became sales engineer and later aviation representative, Westinghouse Electric & Mfg. Co., meanwhile helping to organize the 27th Division Air Service, New York National Guard, in 1921. He commanded it from 1923 until 1931, when he was promoted to lieutenant-colonel and attached to the 27th Division Staff as air officer. In October, 1928, he had resigned from Westinghouse to organize and become president of Eastern Aeronautical Corp., conducting an aviation sales and service business. The company built the first commercial hangar at Newark Airport. During the boom the corporation was expanded to include properties at Syracuse and Elmira, N. Y.

With the starting of the Casey Jones School of Aeronautics, Lt.-Col. Vaughn joined with Casey Jones and Lee Warrender, acting as vice president of the company and still retaining the presidency of Eastern Aeronautical Corp. In addition to his military and commercial activities, this Brooklyn boy who made good in the big city (of Newark) goes in for various committees. He's really a committee hound, a sort of Elk, for he belongs to the Mayor's Welcoming Committee for Distinguished Aviators arriving at New York, several National Air Race committees, is Chairman of the Dealers and Distributors Section of the Aeronautical Chamber of Commerce, is on the Chamber Show Committee, and last year was appointed by Governor Franklin D. Roosevelt as a member of the New York State Aviation Commission, which office he still holds. With all this, he should be able to get together with himself at any time and form a quorum.

BEN TORREY was born in Milan, Mo., May 6, 1896, but fled to California in 1909. From 1915 to 1919 he worked with the Hall-Scott Motor Co., and doubtless one of the motors bit him, for after two years with the 9th Aero Squadron at Mather Field in 1920 and '21, he fell into that morass known as commercial aviation and hasn't climbed out yet. The last time I heard from him he was manager of the Woodson and Corning Airport, operating a school, doing commercial flying, running the government weather bureau and doing his own family washing and ironing as a side line.



Ben Torrey

In 1925 he flew for the California Department of Agriculture on forest patrols. He and the late Sandy Sanders pioneered what is now Oakland Airport. They were the first ones to fly off Bay Farm Island, starting in June,

1926, from a runway they had made themselves with a tractor, scraper and roller. But Ben Torrey is known to fame as the only pilot who ever made \$1,200 legitimate profit out of a crash. Of course, anyone can make a profit on a crash by selling it to Reed Chambers' Aviation Underwriters' Group, but Ben made the profit without having any insurance at all, because he happens to be the sort of genius who can turn a disaster into good luck.

He and a student of his bought an old OX-5 Jenny in January, 1926. Even then the Jenny was not an especially magnificent craft. This one had minor repairs made with haywire here and there, and Ben is of the opinion that some of this new bridgework must have come loose, for the ancient vehicle went into a spin, kept on spinning, and spun right through the roof of a house, the ceiling of the kitchen, and ended up with a jolt beside the stove. The roof and the wings broke the worst effects of the fall and absorbed more of the damage than did Ben and the pupil. All the pupil had was a skinned shin, while Ben collected a black eye, two broken ribs, and a grieved expression. Of course, all this minor breakage was discovered later. Shortly after the moment of impact had been succeeded by a moment of inertia, as the engineers express it, Ben stirred, pushed pieces of airplane away from him, brushed the wires from his clothes, and stepped into the next room.

He was searching for signs of life in the house, for a deathly stillness encompassed him, the pupil, and the remains of the Jenny. Seated at a table, he saw

(Continued on page 64)

AVIATION ENGINEERING

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Determining the Effective Value of Young's Modulus

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• A knowledge of the correct value for Young's Modulus of Elasticity is important in any design practice, but this is especially true in aircraft work where members under combined transverse and end loads are the rule rather than the exception. The most frequently occurring and one of the important cases in which members are under combined loads is that of the conventional wing beam. The importance of the use of a correct value of Modulus E, in the design of wing beams, is apparent, for this value is a measure of the deflection of the beam. And the deflection, when multiplied by the axial load existing in the beam at any point, gives the value of the secondary bending moment. It is, of course, desirable to keep this secondary bending moment a minimum, or even reduce it to zero if possible.

In the ordinary sense Young's Modulus is considered to be constant, and is usually determined by the slope of the stress-strain curve plotted from a ten-

sile test of a small specimen. Familiar values are $29-30 \times 10^6$ for high grade steel, 28×10^6 for low grade steel, and $9.5-10.4 \times 10^6$ for duralumin. This latter material is one commonly used in airplane construction so that the correct value for it is of special importance. Further, being a rather ductile material, the precise value is somewhat vague as can be seen from the range usually given.

The tests to determine the value of E are made from solid specimens of comparatively homogeneous material. The occurrence of duralumin in such a state in an actual airplane structure is rather rare, since nearly all the parts of the structure are made of several components riveted together to form a hollow section of one sort or another. The area enclosed by a section thru a typical metal wing beam is almost never a solid so that the use of E as ordinarily determined must be accompanied by some mental reservations.

The deflection of a solid beam of ho-

mogeneous material is given approximately by

$$d^2y/dx^2 = M/EI$$

M = the bending moment

I = Moment of inertia of the section

E = the Modulus of Elasticity

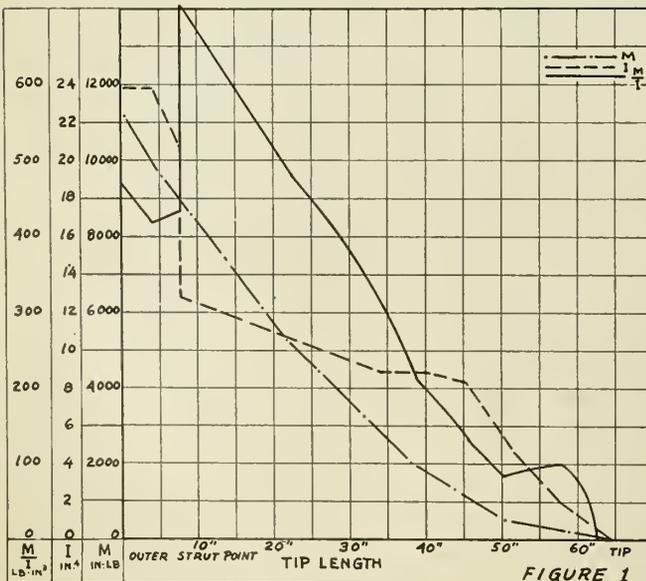
In this theoretical case E is taken as a constant. This relationship, however, is based on certain idealized assumptions which are not found in actual practice, and since we are primarily interested in the application of theoretical knowledge to everyday work it is necessary to know how widely the actual conditions depart from the theoretical ones. The relationship just noted is true for the following conditions: first, that the beam be flexed by a pure moment (shear deflection zero); second, that the material is completely homogeneous; and third, that the section is rectangular in shape and remains plane after bending. Since in practice rarely are these conditions realized, it is necessary to modify the deflection relationship by the introduction of another factor, k, in order to get results that agree with experience. The factor k is a measure of the approach of the real conditions to the theoretical ones. Our deflection relationship then becomes

$$d^2y/dx^2 = M/kEI$$

and in order to use it we are compelled to evaluate the constant k.

Before proceeding with the outline of a method for determining the constant k, however, it is desirable to summarize briefly the advantages that accrue to a structure which is relatively rigid (one in which the deflections are kept to a minimum). While these advantages apply to structures of all types they are especially prevalent in aircraft work where the members are often under combined stresses and where the stresses are near the elastic limit, while the members themselves must be kept as small as possible consistent with safety, in order to keep the weight within reasonable limits.

The bending moment (and hence the stress to a large extent) on an airplane wing beam is made up of that due to transverse air load, and that due to the



M, I and M/I curves for typical beam

axial load multiplied by the total deflection of the beam at any point from a straight line thru the supports. It is obvious that if the deflection due to transverse and axial loads be kept at a minimum, then the secondary bending moments will be small and the total bending moment will approach the primary bending moment as the lower limit. This, of course, is highly desirable, and to this advantage may be added those due to lessened carry-over of bending moments at the joints of the structure, reduced likelihood of flutter, and lessened flexure and working of the members with consequently reduced fatigue stresses. Excessive deflection may also cause considerable change in the angle of attack of certain sections of the wing span, or may cause such movements of the control surfaces as to alter the angle at which the surface meets the relative wind, and hence the forces developed by that surface.

Returning now to the evaluation of k , it can be seen that it will be necessary to determine a separate value of k for each different cross-section or change in the relationship of one part of the cross-section with another. The method used for wood beams, wherein a form factor is determined from the various physical characteristics of the beam cross-section, is well known. The values for the factors were determined partly from theory and partly from test, and the final results checked against many tests which assure their reasonableness. This method of determining the allowable loads is used by the Department of Commerce and is also found in most modern books on airplane design.

Such information is not readily available for metal beams and members, however, and it is the purpose of this note to suggest a reasonable and economical way of getting at the value of E to be used. The method outlined hereafter has the advantages of being economical of analytical and of testing time, that it may be applied to data previously gathered in the process of satisfying various governmental requirements, and that it is as accurate as any ordinary test data. It can be accomplished with no additional test work if desired, and provides an accumulation of data which is valuable when a new beam design is contemplated. The chief disadvantage lies in the fact that to produce the best results the data must be taken on a family of beams of similar construction. This is not, however, nearly so great a disadvantage as it at first appears, since nearly all companies have adopted a characteristic method of beam construction. For this reason the files of all the major aircraft constructors contain reports on tests of beams of similar construction. This method can be readily applied to such data.

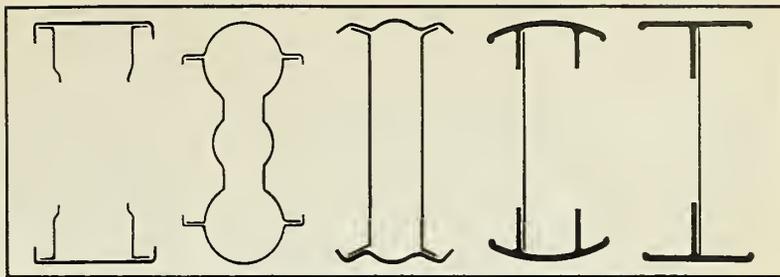


Figure 2. Group of typical fabricated metal beam sections

In the regular static test of a wing beam the tip is loaded as a cantilever, supported at the outer strut point, and stressed in bending, since the axial load is ordinarily so small as to be negligible. The purpose of this tip test is to furnish a check of the shear and moment strengths outboard of the outer strut point. However, it is possible to utilize the results of this part of the test to determine the value of E developed by the type of construction. Since the effect of the axial load on the bending moment has been eliminated, a truer value of E will be obtained.

The tip of the beam is likely to be tapered in depth, or the flanges may be cut away over part of the length, so that widely differing values of moment of inertia may be developed along the span. The value of the applied loads is changing at the same time, since a uniformly varying load distribution is assumed in the original design.

By computing a theoretical deflection (in terms of E) under the actual loading used, and equating it to the measured value of the deflection, it is possible to solve for the value of E developed. The ratio of this E to the theoretical E of the material is the value of the constant k desired.

The best method for doing this depends on the relationship

$$EIy = \int_{x_A}^{x_B} (x - x_A) M dx$$

from which it will be seen that the mo-

ment of the area of the bending moment diagram between any two points A and B with respect to point A is equal to EI times the deflection of point A from a tangent to the beam at point B. This is the well known 'moment-area' method of determining the deflection of a beam. In our case, since I is a variable, it will be necessary to consider the area of the M/I curve rather than the area of the M curve alone.

The curves used in determining the value of E for an actual case are given in figure 1. The moment curve M was plotted from the actual loads applied to the beam during the test. The ordinates of the bending moment curve were found by taking moments of the applied loads about the outer strut point. The values plotted as ordinates of the I curve were computed at frequent intervals along the cantilever, paying particular attention to the changes in section at the ends of the reinforcing, etc. Having plotted the M and I curves, it is a simple matter to determine the values of the M/I curve at at any point, by division, and plot them back on the chart. It is now necessary to get the moment of this area about the point whose deflection is desired, equate it to the actual measured deflection at this same point, and solve for the value of E developed. The moment of the area may be easily found by dividing the area into a number of small vertical strips and getting the moment of each strip about the point whose deflection is desired. The same result can be obtained by means of the integrals if one is available.

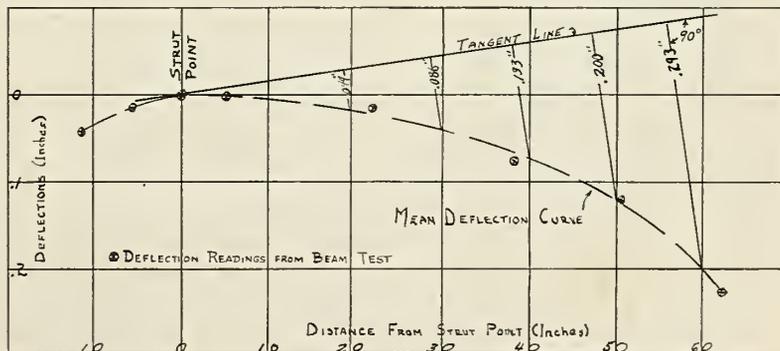


Figure 3. Deflection chart used in determining modulus of elasticity

The results from the beam whose curves are given in figure 1 are given in the table. It should be noted that the deflections computed will be from a tangent to the beam at the strut point, and not from the horizontal or the reference line used to determine the test deflections. However, by plotting the deflections and carefully drawing the tangent at the strut point a reference line of sufficient accuracy can be established. It will be found that the tangent at the strut point will be most nearly accurate, since the reinforcing across that point helps to keep the beam straight and stiff for an appreciable distance. This will perhaps be made clearer by noting from the I curve of figure 1 that the value of the moment of inertia is about twice as great at the strut point as at the adjacent sections, and the stiffness is correspondingly increased. In table 1 the values of E as determined from the deflections at the various points between the strut and the beam tip are given. The degree of consistency is high, as can be seen. It will be found in some cases that if the deflections readings have not been carefully taken that it may be best to plot a smooth curve of the deflections and to use the values from it in determining the value of E. This is a matter of judgment to suit the individual case. The values given in the table are from such a curve.

TABLE 1

E developed when deflections are referred to a tangent thru the strut point:

Station (in.)	Deflection (in.)	E (lbs./sq. in.)
60	.293	8,130,000
50	.200	8,890,000
40	.133	9,080,000
30	.086	8,150,000
20	.049	6,240,000

The low value of E shown for the station 20 inches from the strut point may be explained by considering that as the deflection becomes smaller the normal error in reading the deflection scales becomes proportionally greater. If the value of the deflection had been .040 instead of 0.49 inches, the corresponding value of E would become 7,650,000 lbs. per sq. in.

As mentioned before, these values of E and deflections are for about 50% of the design load for this beam. A check of the same points using the values of M and deflection corresponding to loads nearer the design gives results of equivalent closeness and consistency. The values of E for the points between the tip and the strut were determined in a manner similar to that outlined above. The determination of the tangent in the above case was made graphically from the deflection curve as shown in figure 3. This was necessary, for no particular effort had been made in the process of testing to locate this tangent. With special at-

tention devoted to this point better results should be obtained.

There are several methods of measuring this tangent. One is by means of a long vertical pointer at the strut point, and getting the movement at two points along this auxiliary beam. This is necessary because of the shortening of the wing beam under end load. Another way is to attach several accurately-reading dial gauges to the beam inboard and outboard of the strut point, and determine the slope from the difference in dial readings. The stiffness of the beam through the strut point suggests this way as being feasible.

In conclusion, while it may appear from the description that this method is

long and tedious, actually, such is not the case. If the values of the moment of inertia have already been computed it is quite rapid. In one case the complete calculations took in the neighborhood of three hours. This time, of course, depends on the complication of the structure. The use of the wing tip length rather than some inboard section eliminates the complications and difficulties of considering the axial load, a procedure which simplifies the work.

The values of E computed for this beam are about 25% higher than those ordinarily used in design, and while this gain affects the secondary bending only, it represents, nevertheless, an amount worth considering.

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N.W., Washington, D. C.

Wind-indicating airways beacon. Byron Q. Jones, Washington, D. C. (1,915,319)

Variable-pitch propeller. Edwin Kohlstedt, Alta, Iowa. (1,915,465)

Supporting plane for aircraft. Julius F. Ziegler, Vienna, Austria. (1,915,481)

Method and apparatus for making propeller blades. John Squires, Hagerstown, Md. (1,915,699)

Method of making propellers. Fred Weinberg, Berkeley, Calif., assignor to Bendix Aviation Corp. (1,916,027)

Aircraft carburetors. Giacomo Mezzini, Milan, Italy. (1,916,060—1,916,062)

Airplane. Louis Bleriot, Suresnes, France. (1,916,092)

Flying machine. Nick P. Softis, St. Louis, Mo. (1,916,340.)

Life-saving apparatus for aviators. Clarence L. Tibbals and Frank M. Hobson, Washington, D. C. (1,916,345.)

Amphibian aircraft. Vincent J. Burnelli, New York, N. Y., assignor to Burnelli Aircraft, Ltd. (1,916,413.)

Multimotored amphibian. Igor Sikorsky, College Point, N. Y., assignor to Sikorsky Aviation Corp. (1,916,444.)

Airplane. Randolph F. Hall, Rochester, N. Y. (1,916,475.)

Aircraft. James E. Lake, Evanston, Ill. (1,916,956.)

Landing-gear for aircraft. Theodore P. Wright, Port Washington, and Robert R. Osborn, Garden City, N. Y., assignors to Curtiss Aeroplane & Motor Co. (1,917,078.)

Radiant energy guiding system for airplanes. John H. Hammond, Jr., Gloucester, Mass., and Ernst F. W. Alex-

anderson, Schenectady, N. Y.; said Alexander assignor to General Electric Co. (1,917,114.)

Aerial bomb. Gale H. Hedrick, Glenshaw, Pa. (1,917,263.)

Line of position and wind drift plotter. Philip V. H. Weems, U. S. Navy. (1,917,278.)

Navigational instrument. Elmer L. Woodside, U. S. Navy. (1,917,282.)

Aircraft. Vincent J. Burnelli, assignor to Uppercu-Burnelli Corp. (1,917,428, 1,918,687 and 1,918,688.)

Supercharger. David Gregg, Caldwell, N. J., assignor to Eclipse Aviation Corp. (1,917,444.)

Three-hulled aeropship. Samuel E. Hitt, Elyria, Ohio. (1,917,446.)

Aircraft of the rotative-blade type. Agnew E. Larsen, Huntington Valley, Pa., assignor to Autogiro Co. (1,917,530.)

Flying machine. Harry T. Booth, Freeport, N. Y. (1,917,574.)

Aircraft engine. Giuseppe M. Belanca, New Castle, Del. (1,917,791.)

Timer for airplane engines. Wolfgang E. Schwartzmann, Longmeadow, Mass., assignor to United American Bosch Corp. (1,917,907.)

Aircraft wheel brake system. Ernest F. Goodyear, Moxhall Park, Joseph Wright, Stoke Park, and Henry Trevasakis, Keresley, England, assignors to Dunlop Rubber Co. Ltd., London, England. (1,917,933.)

Helicopter control and stabilizer. William F. Gerhardt, Grosse Ile, Mich. (1,917,965.)

Aerial sign. W. C. Keener, Princeton, Ill. (1,917,978.)

Aircraft. Alex F. Arcier, Dayton, and Reginald W. Gibson, Troy, Ohio, assignors to Waco Aircraft Co., Troy. (1,918,079.)

Automatic pilot for dirigible craft. Bert G. Carlson, Elmhurst, N. Y., assignor to Sperry Gyroscope Co. (1,918,082.)



Engine installation and direct side view of the record-breaking Macchi-Castoldi M.C. 72

the present mark of 440 miles an hour was made by Warrant Officer Francesco Agello on June 2.

The Fiat AS6 engine was extended in order to obtain the minimum possible frontal area. Four-tenths of the fuselage of the M.C. 72 is required to house the engine, and therefore the wing and float strut attachments occur at the space occupied by the engine. The problem of carrying the stresses through was met by using steel tubular trussing surrounding the engine and provided with suitable fittings for the attachment of wings, floats and rear portion of the fuselage. This structure is designed to withstand all conditions of loading, including unsymmetrical, side and landing-on-one-float loading. The rear section of the fuselage attached to this truss starts with the pilot's cockpit and terminates at the tail surfaces. This part is of wooden monocoque structure, demountable as a unit and attached to the front tubular portion by means of four bolts. The front or chest section of the fuselage is formed by the oil tank, the outside wall of which is exposed to the airstream. Immediately below the engine is located the oil and water system, consisting of numerous pipes.

The wing is of all-metal construction, the internal structure being of 2B alloy while the covering is of duralumin. Flat tubular water radiators are smooth and fully enclosed within the wing, their outside surfaces conforming exactly to the airfoil profile. Radiators mounted on the floats also follow the outside contour with no projections. The wing is braced by means of special streamline wires designed with a view to eliminating vibration, the front upper wires being mounted directly to the structure attached to the engine. Both metal and wooden floats were designed, and both types were found to give satisfactory results. The floats contain cylindrical fuel tanks. Each float has three radiators built into its outside surfaces; the forward one is a water radiator, and the center and rear radiators are for cooling the oil. The float struts, of heavy tubing, are stream-

lined by means of water radiators. In addition to these radiators it was necessary during the summer to add another, located under the rear part of the fuselage between the rear of the cockpit and the tail. Aileron controls are fully enclosed within the wing and are operated by push-pull rods; the elevator control is similarly operated, and a reduction gear is introduced in the rudder control.

While complete specifications cannot be given here, the following data will give a good general idea of the compactness of the M. C. 72.

Specifications

Weight, empty	5,510 pounds
Weight of pilot	154 pounds
Weight of fuel	926 pounds
Weight of oil	77 pounds
Gross weight	6,667 pounds
Weight of engine	2,083 pounds
Wing area	162 square feet
Wing loading	41.4 pounds per sq. ft.
Rated power	2500 horsepower
Maximum h.p. at 3000 r.p.m.	2800
Power loading	2.6 pounds per h.p.
Engine weight, lb. per h.p. (rated) . . . . .	.833
Engine weight, lb. per h.p. (max.) . . . . .	.744

Digest of Technical Articles from Foreign Publications

ELSA GARDNER

German Research

The German Research Institute, C. Wittmann. Aircraft Engineering, Vol. 5, No. 52, June, 1933, pp. 121-125 and 137, 12 figs.

DEVELOPMENT, organization and work of the Deutsche Versuchsanstalt fuer Luftfahrt in the past year are described and illustrated. The research, equipment and instruments in the Statics, Engine, Photography and Navigation, Flying, Aerodynamics, Materials, Electrotechnic and Radioelectric, and other departments are discussed. The author outlines the activities of the first five especially and gives references to reports of results which appeared in English in *Aircraft Engineering*.

Townend Ring

Wind Tunnel Tests on a Bristol Bulldog Fitted with a Thin Townend Ring, W. G. A. Perring. (British) Aeronautical Research Committee—Reports and Memoranda No. 1504, August 4, 1932 (published June 13, 1933), 18 pp., 8 figs.

THE TESTS described were made on a one-fifth scale model representative of a single-seater Bristol Bulldog airplane fitted with a Jupiter VII engine. Those made without propellers showed that the drag reduction due to the ring was greatest with the ring at -9 degrees, while the addition of the slipstream had only

a slight effect on the drag reduction due to the ring at -6 and -9 degrees. The addition of the ring had practically no effect on the propeller torque. The tests resulted in a predicted rate of climb of 460 feet per minute, compared with 360 feet per minute achieved at full scale. It was also shown that the performance of the full-scale aircraft might be improved by a further 10 per cent of the improvement already achieved if the ring full scale were changed through three degrees to a larger negative angle.

Extensimeters

The Measurement of Elastic Deformation (Per la misura delle deformazioni elastiche), O. Vocca. Rivista Aeronautica, Vol. 9, No. 4, April, 1933, pp. 44-57, 7 figs.

THE DESIGN and operation of two modern types of extensimeters for measuring the elastic deformation of airplane materials and parts are discussed, namely the Huggenberger and Schaefer extensimeters, and their advantages and defects are reviewed. After some observations on the errors which occur with the use of extensimeters in general, the author develops an analytical solution for these errors and describes other specifications for the equipment.

Gasoline and Diesel Engines

Some Notes and Observations on Petrol and Diesel Engines, H. R. Ricardo. Royal Aeronautical Society Journal, Vol. 37, No. 270, June, 1933, pp. 509-522 and (discussion) 523-546, 20 figs.

TWO MECHANICAL DEFECTS which are all too prevalent in gasoline and Diesel engines are discussed, namely, the cracking of the white-metal linings in the connecting-rod big-end bearings, and cylinder wear. In taking up the former the author compares the conditions as between a gasoline and a heavy-oil engine in so far as they affect the crankpin bearing. He feels that there is not yet enough evidence to justify him in putting forward the theory of corrosion as the chief factor in cylinder wear, but considers it will account for the huge discrepancy between the rate of wear of the rings and the liner. He thinks that there is some indication that wear is less when the cylinder walls are kept hot, as in air-cooled engines, but he has not yet been able to get sufficient data to be sure of this.

Superchargers

Performance Tests of Certain Experimental Designs of Diffuser and Impeller in a Centrifugal Supercharger, with Particular Reference to Their Influence Upon Surging, Including the Effect of an Impressed Periodicity of Flow, G. V. Brooke. (British) Aeronautical Research Committee—Reports and Memoranda No. 1503, December, 1932 (published June 13, 1933), 43 pp., 28 figs.

In the experiments described, it was found that the simple vaneless diffuser was beneficial in regard to postponement of surging, but produced very low values of adiabatic efficiency and pressure ratio of compression. Improvements in compression ratio and efficiency were obtained from shrouded impellers, in particular the design incorporating curved blades affording a very high compression ratio, but reaching its maximum value at each impeller speed at an air flow in close proximity to that at which surging commenced. Comparing the performances of the supercharger on the basis of the useful power which it enables a hypothetical engine to develop and excluding the cases of the plain vaneless diffuser and the less favorable vane angles, no very pronounced superiority was exhibited by any of the combinations of experimental components tested, although the spiral volute diffuser possessed certain characteristics rendering it particularly suitable for application to aircraft-engine superchargers.

Metal Corrosion

The Corrosion of Metals, Its Causes and Effects (La corrosione dei metalli: cause ed effetti), G. Guzzoni. L'Aerotecnica, Vol. 13, No. 6, pp. 714-744, 21 figs.

THE ELECTROCHEMICAL theory of corrosion is discussed. Starting with the analogy between osmotic pressure and tension of dissolution, the author sets forth

the theory of formation of piles and voltaic couples between different metals in contact with a liquid and refers to the possibility that this phenomenon occurs due to small chemical or structural differences in a metal in touch with the film of moisture covering each metal exposed to the air. In this way and by means of the Evans differential aeration theory, he explains the corrosion theory.

He takes up various methods of protecting metals from corrosion, by the use of Alclad, Vedal, Duralplat and by the addition of special elements for lowering the corrodibility of alloys.

Propeller Tests

Catalog of Propeller Tests (Catalogue d'essais d'hélices), Service Des Recherches De L'Aéronautique, Publications Scientifiques et Techniques du Ministère de L'Air, Vol. 1, April, 1933, 23 pamphlets, many figures.

RESULTS of tests on 18 Ratier metal propellers, which were obtained in the large wind tunnel at Paris, are shown and include two-, three- and four-bladed propellers. The diameters of these propellers were the same, 1.5 meters, and the test engine developed 200 horsepower, operating at from 1,000 to 2,650 r.p.m. The air speed was nearly 300 kilometers per hour. The highest maximum efficiency of 79 per cent was obtained with No. 25, four-bladed propeller operating at 2,000 r.p.m. and having a pitch ratio of 1.035 and relative blade-width ratio of 0.10.

There is a four-page pamphlet for each propeller, the first two pages defining the propeller and the last two giving its characteristic coefficients in curves. Three additional leaflets, dividing the propellers into groups according to the number of blades, compare the characteristic curves of thrust, power and efficiency.

Airplane Speeds

Possible Increase in Level Speed of High-Speed Aircraft Caused by a Diving Start, H. M. Garner and R. K. Cushing. (British) Aeronautical Research Committee—Reports and Memoranda No. 1530, Dec. 1, 1932 (published July 31, 1933), 4 pp., 7 figs.

CALCULATIONS are given for the maximum increase in speed which can be obtained by the pilot in the S6B racing airplane at the end of dives on which the accelerations are limited to reasonable amounts. The corresponding excess of speed along the course is also calculated. It was found that a possible gain of speed in the dive of 42½ feet per second and of 24½ feet per second along the course may be obtained without excessive accelerations, but required a very high standard of skill on the part of the pilot. The gain of speed secured by Flight Lieutenant Stainforth on the second speed record with this airplane agreed with the theoretical value to the order of accuracy of the measurements.

Aeronautical Engineering

International Technical Work for Aeronautics (Journées Techniques Internationales de L'Aéronautique). Chambre Syndicale des Industries Aéronautiques, 1933, 278 pp., 128 figs.

TECHNICAL PAPERS are given which were presented at an aeronautical engineering conference held under the auspices of the Chambre Syndicale Des Industries Aéronautiques, November 28 to December 2, 1932. Both written and oral discussions of the papers are also given. As well as the foremost aeronautical engineers in France, the authors include Crocco, Von Kármán, Zeller and Pye and cover all phases of aeronautics, such as airplane and engine design, meteorology, radio, fuels, metal corrosion, aerial photography and aerodynamics.

The papers are as follows: Scientific Research and Its Aeronautical Applications, G. Labussiere; Fuels, M. Bonnier; Lubricating Oils, M. Champsaur; The Radio in Aeronautics, P. Brenot; Considerations in the Use of Metallurgical Products in Aviation, M. Grard; Metallurgical Products Employed in Aeronautics, J. Cournot; The Protection Against Corrosion of Metals and Alloys Used in Aeronautical Construction, R. LeCoeuvre; Meteorological Problems of High Altitudes of Interest to Aeronautics, P. Wehrle; The Airplanes, H. de L'Escaille; The Seaplanes, General Crocco; Some Present Problems in Aerodynamics, T. Von Kármán; The Engine, M. Pye.

Aerodynamics

Calculation of the Force of a Wind the Direction of which Changes Rapidly (Prévision de l'action d'un vent dont la direction varie rapidement), A. Lafay. Publications Scientifiques et Techniques du Ministère de L'Air, No. 24, 1933, 42 pp., 7 figs.

EFFECTS of a rapidly changing wind on a wing of known static polar, which can be foreseen and calculated with sufficient approximation, are discussed, and their application to the Katzmayer effect and to autorotation is determined. The author points out that it is possible that the results and the utilization of the Katzmayer effect, which should accompany the waves of atmospheric currents, are influenced by the fact that the wave length is too near the dimensions of ordinary airplane wings. To overcome this difficulty the author recommends the use of louvered side wings. He shows the possibility of obtaining a representation of the whole aerodynamic field around some cylindrical body by utilizing a wave of a refractive fluid sufficiently large to emit lines parallel to its cross-section.

The author also takes up the question of improving the lift of a wing by the use of jets on the upper surface. It was found that the jets are influenced much more by their speed of projection than by their thickness.

(Continued on page 43)

NEW EQUIPMENT and METHODS

Electric Timer for Automatic Application

• AN ELECTRIC TIMER that lends itself to automatic and remote-control applications has been announced by the General Electric Co. By combinations of two or more timers, or by using one in conjunction with other types of automatic time switches, it is possible to meet a wide range of process schedules.

The timer, designated as Type TSA-10, is "all electric." Timing is started by closing a switch, resetting is automatic when the control circuit is de-energized; the timing period is readily adjustable over a wide range. When used as a process timer, it can be arranged to operate a signal or terminate a process at the end of a predeterminate period. By the use of relays and timers together, entirely automatic control can be provided for almost any process.

The Type TSA-10 timer has two scales, graduated in hours or minutes according to the rating of the timer. One of these scales has a range three times that of the other, permitting a wide range of time-interval selection in a given timer. The user chooses the more appropriate scale for the interval he desires to time by setting the scale-selector lever. He then sets a movable contact at the point on the time scale corresponding to the interval to be timed.

It is set in operation by energizing a "clutch-coil" circuit in the timer by a push button or by the same switch that initiates the process. The operating pointer of the timer then moves up the time scale and operates the timer contacts when it reaches the point at which they are set. In some applications the timer is arranged to reset itself automatically after operating the contacts; in other applications the timer is reset by opening the "clutch-coil" circuit manually. This is optional, according to how the unit is wired.

The timing element is a Telechron motor, self-starting and synchronous. It eliminates winding, regulating and oiling. The mechanism is guarded against injury by auxiliary contacts which prevent the operating pointer from running "off-scale."

The motor of the timer drives a differential gear system, one side of which can be "locked" by an electromagnetic clutch. The other side of the differential mechanism is geared to the operating pointer. When the "clutch coil" is energized, the timing motor drives the operating pointer up the scale.

When this pointer reaches the place on the scale where the adjustable contacts have been set, it closes (or opens) these contacts. The operating pointer keeps

these contacts closed (or open) until the "clutch-coil" circuit has been de-energized, when the operating pointer is reset to zero by a spring and is ready to repeat the cycle. The time required for the pointer to reset to zero varies from one to three seconds, depending upon the time scale used.

The timer is designed to act so that repeated operations of the timer with the adjustable contacts set at the same point on the scale will not show a variation of time interval exceeding one per cent of the full-scale rating of the timer.

The timers are rated one ampere at 115 volts. For applications where the load to be handled exceeds the capacity of the contacts, it is necessary to use a magnetic switch in conjunction with the timer. They are available for 60, 50 or 25 cycles, 115 or 230 volts, contacts normally opened or closed, and with time intervals of 5 to 15, 10 to 30, or 20 to 60 minutes.

Miniature Spotlight for Inspection Jobs

• A PEEP-HOLE light for searching out small parts of equipment to be repaired or inspected has been developed by Westinghouse Electric and Manufacturing Co. at East Pittsburgh, Pa. It is designed to enable the repairmen thoroughly to inspect the bearings, oil rings and small parts of engines and other equipment without disassembling.

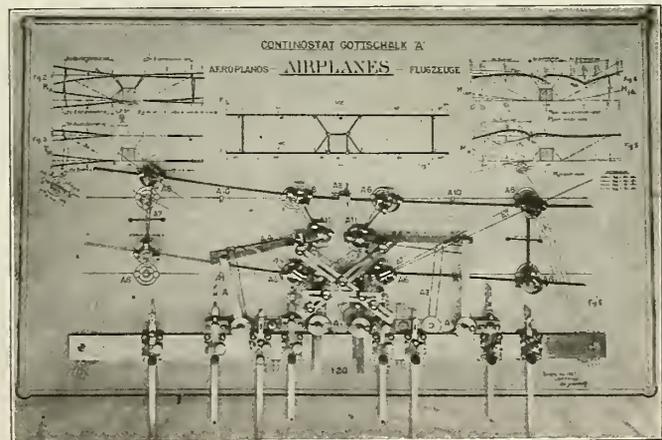
The miniature spotlight was constructed from a fountain-pen type flashlight. It is attached to a flexible cord and arm in a convenient position over the bench and is energized with a small transformer mounted on the wall. When not in use, the light may be placed in the receptacle at the end of the arm and swung aside until needed.

Instrument for Mechanical Analysis

• THE "CONTINOSTAT GOTTSCHALK," an instrument for mechanical analysis, has been used mainly for statically indeterminate building structures in which the various members are exposed to transverse loads. Recently it was discovered that it can be applied with equal facility and accuracy to combined transverse and axial loads, therefore making it useful for such structural members as airplane wing spars.

Details of the instrument have been furnished by Dr. Albert Gottschalk, who represents the inventor, his brother, in the United States. The instrument consists mainly of a steel sliding bar, a number of slides representing beam supports, and of steel splines of various lengths and thicknesses, which automatically form influence lines for bending moments, after a certain angle clamp has been inserted and moved to the point where ascertainment of the bending moment is desired. The rest consists of multiplication of the loads with their ordinates, and addition or subtraction of these products, as they deviate to one or the other side of the original beam line. The bearing pressure is ascertained similarly by deviating that support for which the pressure is desired, to a convenient extent in the direction of the load, and dividing the aggregate of the products by this deviation. Sectional variations in beam thicknesses are automatically taken care of by assembling of splines according to bending moments received.

As all forces are taken up in the instrument itself, it may be removed from the drawing board in its deviated shape and replaced again, if so desired for comparisons. All measuring is done with the common rule in the scale of the drawing.



Application of the "Continostat Gottschalk," determining stresses of a biplane

Evolution of Boeing Mail and Passenger Planes

RICHARD M. RUMMEL

● Those who would know of America's progress in commercial air transport plane development within the space of a comparatively few years and who would trace the evolution of equipment to meet the demands of an ever-growing air traffic could do no better than read the history of the transcontinental route between San Francisco and New York City—a history whose first chapter was written by 90-mile-per-hour open-cockpit biplanes and whose latest chapter is being chronicled by three-mile-a-minute cabin transports.

Back in 1919 and 1920, surplus Army planes were carrying mail over sections of the transcontinental route, gradually bringing the country's two seaboard together. These were of wood and fabric, single-engined type, capable of cruising at between 90 and 100 miles an hour; 400 pounds of mail was a big load.

In 1933, new high-speed, twin-engined passenger and cargo transports have placed the Pacific and Atlantic coasts just 20 hours apart. These planes are of the all-metal, low-wing type, capable of cruising at 171 miles an hour with 10 passengers, two pilots, a stewardess, baggage and cargo; pay load, 2,400 lbs.

Much of the story intervening between the 1920 and 1933 transcontinental equipment is disclosed in the files of the Boeing Airplane Co. of Seattle, Wash. For 17 years this firm has been producing commercial and military aircraft; for six years it has been turning out planes for service on the coast-to-coast airway. Today, its Boeing 247 of United Air Lines is taking to the route as some of its original equipment goes into retirement.

More than 40 of the new Boeings now are being operated by United Air Lines between San Francisco and New York City, providing the fastest multi-motored commercial transport schedules in the world. Setting a new tempo for the transaction of coast-to-coast business, they make it possible for passengers to leave the Pacific Coast in the evening, reach Chicago the next noon and be in New York in the late afternoon. West-bound travelers may leave New York shortly after midnight, have breakfast in Chicago and be in California that same day. Chicago and New York are but 4¾ hours apart.

These travel times have not come about overnight. The planes which make them possible are direct descendants of other

Boeings which, year by year, have been bringing new things to transcontinental air transport progress.

It was in 1927 that the Boeing company, until then largely occupied with military aircraft manufacture, turned its attention to quantity production of commercial planes. In that year, the Boeing interests had taken over operation of the San Francisco-Chicago section of the transcontinental route from the Post Office Department. Equipment was needed quickly to get that operation under way.

Five months after the first preliminary steps, 24 planes had been delivered. They were of the single-engined, two-passenger-and-cargo type—first of the famous Boeing "Forties."

Designated as the Model 40-A, this plane had a cruising speed of 110 miles an hour with 1579 pounds of pay load, including two passengers and 1200 pounds of mail. Passenger comfort was not one of its features, since the cabin seats were provided more for the accommodation of mechanics and other company men than for itinerant travelers.

Metal had come into the aircraft manufacturing picture by this date, with the result that welded steel tubing was em-



Improvement of the Boeing single-engined mail and passenger planes is depicted in this group. Upper views show the Monomail Model 221 monoplane and the original Model 40; below are the single-place Model 95 and the Model 40-B4

ployed for the 40-A's structure, covered with duralumin and fabric. Wings and spars were of spruce, fabric covered, and the landing gear was of steel tubing.

As transcontinental passenger traffic began to grow, further accommodations were needed. The Boeing company responded with its Model 40-B4, a single-engined biplane similar in appearance and construction to the 40-A but with four passenger seats instead of two and with a 525-horsepower Pratt & Whitney Hornet engine in place of the 40-A's 420-horsepower Wasp. This plane boosted the speed by five miles an hour, cruising at 115 miles an hour with a pay load of more than 1400 pounds.

In 1929, speed took another jump when the company brought out an all-mail plane, designated as the Model 95. Carrying its pilot and 1600 pounds of mail at a cruising speed of 118 miles an hour, it proved instantly popular.

The Model 95 was equipped with a 525-horsepower Hornet. For its fuselage structure, the Boeing company made its first application of bolted duralumin and steel tubing, this marking a departure from the welded steel tubing structure of the 40's. The fuselage was dural and fabric covered, spars were of spruce, ribs were spruce and mahogany plywood, the wing covering was fabric, and tail surfaces were of metal frame and covering.

In developing the Model 95, the need for increased passenger provisions was not overlooked. In 1928 four 12-passenger, tri-motored transports designated as the Model 80 were turned out. Equipped with three 425-horsepower Wasp engines and with a cruising speed of 115 miles an hour, this plane marked a radical advancement in air transports.

For several months, the Boeing 80's

flew the San Francisco-Salt Lake City stretch at night with mail only. Then they began carrying passengers on both day and night schedules as the first transports to be so employed in regular service.

After the Model 80 came the 80-A, a 14-passenger carrier powered with three 525-horsepower Hornets. Boasting a number of refinements over its predecessor, it earned the title of "pioneer Pullman of the air." With a pay load of more than 4000 pounds, it cruised at 115 miles an hour. Eleven of these planes were built for transcontinental travel.

In the case of the Model 80, welded steel tubing, fabric covered, was used for the fuselage structure, while in the Model 80-A, a combination of welded steel tubing and bolted dural tubing was employed. Both planes had spars and ribs of dural, fabric covered, and landing gear of welded steel tubing.

And so the story of Boeing transportation progressed. What had been the Boeing Air Transport Co. became a division of United Air Lines. A fleet of Boeing 80's and 80-A's brought coast-to-coast travel time down to 27 hours.

The Boeing Monomail made its debut in 1931. Actually, it proved a forerunner of the 1933 Model 247. It was the first successful smooth-skin commercial transport ever built and the first with retractable landing gear. It was of the all-metal, low-wing, single-engined type, equipped with a 575-horsepower Hornet. Carrying five passengers, their baggage, a pilot and 750 pounds of cargo, it could cruise at 140 miles an hour. Fully loaded, it took off in 18 seconds, climbed 720 feet a minute, and had a service ceiling of 14,700 feet. Its minimum cruising range was 500 miles.

Skin stiffeners, longerons and bulk-

heads of square and rectangular dural tubing, with smooth dural skin covering, made up the Monomail's fuselage. Wing panels were a framework of square and rectangular dural tubing, trussed spars and dural trussed ribs, also covered with smooth dural skin.

All-metal construction, quite obviously, had arrived for Boeing commercial transports. With it, it brought new possibilities for streamlining and fairing—hence, increased speed. It made possible, too, the use of the cantilever wing with adequate internal bracing.

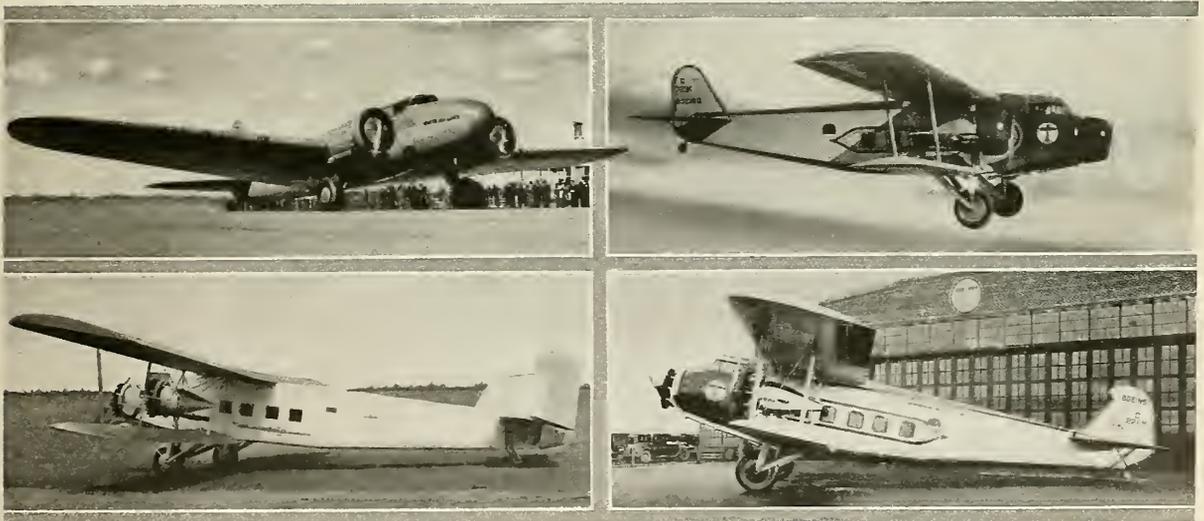
The Monomail was only a step. Early in 1932, United Air Lines turned to the Boeing company for another development—a medium-sized transport which would combine high factors of performance, strength, pay load, passenger comfort and operating economy.

All the experience of the Boeing firm in aircraft manufacture and of United Air Lines in more than 50,000,000 miles of air transport operation was brought to bear in developing the 1933 carrier which was described in detail and illustrated in the April AERO DIGEST.

Boeing officials knew the type of construction desired, knew the art of tooling up to insure precision work and interchangeability of all main parts, had available all their past records on stresses, weights, balances, etc.

In service, the Boeing 247 is showing all the benefits of such close collaboration between an experienced aircraft manufacturer and its affiliated air transport operating company.

It is this sky carrier which today is honorably retiring other earlier Boeings from the airways—Boeings which, though still serviceable, are no match for the newer equipment.



In this group is shown the development of Boeing multi-engined mail and transport aircraft. Upper views show the newest Model 247 monoplaner and a recent Model 80-A in flight; below are the original Model 80 and an early Model 80-A



At the completion of the 400-hour test

● Fifteen years ago the entire life of the majority of aircraft engines was in the neighborhood of 300 hours. Overhauls every 20 to 50 hours were the general rule. Today the average life of representative American aircraft engines is considered to be 2500 hours, and dependable operation is regularly obtained for from 200 to 350 hours between overhauls.

The improvement has been the result of steady progress in the technology of engine design and construction; largely in regard to details of the component parts rather than major changes in basic design. Simplicity is the goal of the good engine designer; in fact, it has been said appropriately that the only perfect aircraft engine will be one which has no moving parts—yet, the trend is toward greater complexity, and it is fortunate that in spite of this fact the cost of engine upkeep is steadily decreasing.

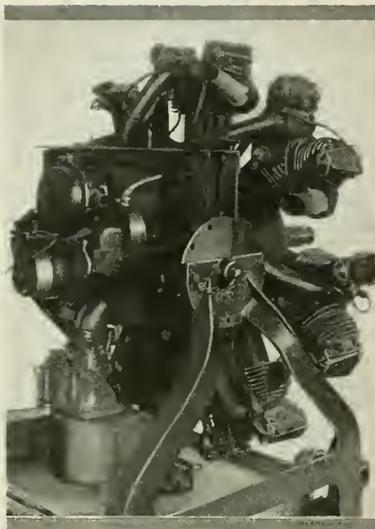
Better materials and methods of treatment, improved machining and better lubricating oils have aided in extending the life of bearings, but probably the greatest factor is the better understanding of the principles of proper bearing lubrication. Each moving part in an aircraft engine has its own peculiar requirements in the matter of bearing surfaces. Once these requirements are understood and proper consideration given to them in the design and fabrication of the bearing, the resulting life of the parts is greatly extended.

Concrete evidence of the progress being made was demonstrated in a recent endurance test conducted by the Wright Aeronautical Corp. The test was of routine nature except that the running time before overhaul was increased to 400 hours in order to obtain accurate data on bearing wear, cost of overhaul, and reliability to be expected in service. The

400-Hour Endurance Test of the Wright Whirlwind R-760E-1

HENRY C. HILL

Project Engineer, Wright Aeronautical Corporation



Accessory end of the 285 h.p. Whirlwind

engine was the Whirlwind 285, model R-760 E-1 seven-cylinder air-cooled radial of 285 horsepower. This model is a refinement of the Whirlwind 250 and of similar design except for increased compression ratio and many detail improvements to take care of the increased power output. Preliminary development and standard type test endurance were completed in 1932 and Approved Type Certificate awarded. The same engine was then subjected to a continuous test of 400 hours covering a period of approximately two months during which the engine was run eight hours a day every day except Sundays. The output and speed of the engine were regulated as follows:

First 50 hours—wide open throttle, rated speed plus 25 r.p.m. (2125 r.p.m.)

Second 50 hours—in five-hour periods, each consisting of ½ hour full throttle and 4½ hours at 90% full power and 97% rated speed.

Last 300 hours—simulated flight operation in two-hour periods, each consisting of 10 minutes full-throttle rated speed,

one hour, 40 minutes, at 1900 r.p.m. cruising, and 10 minutes idling.

The first hundred hours constituted the standard Government 100-hour endurance test, and on top of this was 300 hours of "flight operation" typical of conditions in severe airline service. The graphical logs are reproduced for the first and last 100 hours, showing the method used of keeping a visual indication of changes in power, revolutions, fuel and oil consumption and other data as the test progressed.

Dynamometer calibrations of the engine power were made before and after the test, the results plotted in curve form.

From careful measurements of the moving parts in the engine made before and after the test, the wear of bearing surfaces was figured. The final bearing clearances were then compared to the standard clearance chart used in the overhaul of Whirlwind engines, and from these figures were determined the replacements required to recondition the engine for another period of 300-400 hours.

The 400 hours of unusually severe operation was obtained without any forced stops. Better appreciation of the severity of this test may be realized when it is considered that a typical four-place cabin airplane would have been propelled approximately 53,000 miles.

Loss in Power Negligible

The loss in power after 400 hours was almost negligible. The actual decrease in power as shown by the difference between the two power curves was seven horsepower, yet the final output was still nine horsepower greater than the guaranteed power of a new engine.

Spark plugs operated the entire 400 hours without attention. It has been considered a normal requirement to reset spark plug electrode gaps after every 20 to 50 hours' operation.

To make the test condition unfavorable, the lubricating oil was not changed during the 400-hour period, yet no condition was found to indicate poor lubrication of bearing surfaces. The low oil consump-

tion of one pint per hour average meant that fresh oil was added to the tank at the rate of only two gallons every 16 hours.

In spite of the severity of the test, the condition of the engine was found to be excellent. There were no evidences of failure or undue wear. Cylinder walls, for example, showed a maximum wear of only .0005 inch, and out of the 42 final measurements (six per cylinder) only three were not within the manufacturing tolerances for new cylinders.

Similarly, wear of pistons was 0 to .0013 on bearing faces; knuckle pins, .0001 to .0006 on the diameters; crankshaft journals, 0 to .0011 on the diameters.

Comparison of the final clearances of the bearings throughout the engine with the maximum allowable clearances listed in the standard overhaul chart showed that in the case of only two parts had the clearance reached or exceeded the maximum figures; namely, one exhaust valve bronze guide, and one crankcase bearing sleeve.

In addition to these parts, it was necessary to replace only the following completely to recondition the engine for another 300-400 hours: Two exhaust valves (faces rough due to lack of grinding-in); five link rod bushings (small fatigue cracks in outer edges); set of piston rings, gaskets and rubber oil seals (always changed at overhaul).

The smooth, polished appearance of the bearing surfaces as they came from the engine after the 400-hour test was noteworthy. This was particularly evident in the case of the forged aluminum alloy pistons. Sludge cake was removed from the inside of the crankpin and dirt from the inside of the rear main journal and from the oil inlet strainer. This material was composed chiefly of oil sludge, carbon particles, sand and a few fine metal chips. A large amount of dirt was caught by the carburetor intake air cleaner. In addition

to the engine strainers, an external Cuno piled-disk type oil filter was used in the oil line, and considerable credit for the fine appearance of the bearings is due this filter, which removed much of the dirt which always finds its way into the oil.

Study Reveals Interesting Points

Study of the results of this test indicates that the limiting features preventing much greater than 400 hours between overhauls are (a) the need of regrinding exhaust valves, and (b) the amount of dirt introduced into the engine through the carburetor and the lubricating oil. In regard to exhaust valves, it appears that after long continued running without regrinding, the valve seat faces gradually roughen until slight leakage occurs, after which local overheating takes place at the point of leakage, causing eventual development of pits or grooves. It was these grooves (one on each of two valves) which made replacement of two valves advisable after the 400-hour test. The alloy bronze seats in the cylinder heads were in good condition in all cases and needed only relapping.

With reference to the second limiting feature (dirt in the lubricating oil), this is the controlling factor on bearing life, given a well designed bearing and good oil. This was forcibly borne out by the results of the 400-hour test. Wear would not have been nearly so small without the precaution taken to supply clean oil to the bearings, both in the design of the bearings themselves and in the cleaning accessories. It is for these reasons that careful servicing of these air and oil filters (now standard equipment on Whirlwind engines) is most essential.

Piston rings, once the bugbear of high-output engines, did not prove to be a limiting feature. The rings in the test engine, after 400 hours, were in good condition, all being free in their grooves,

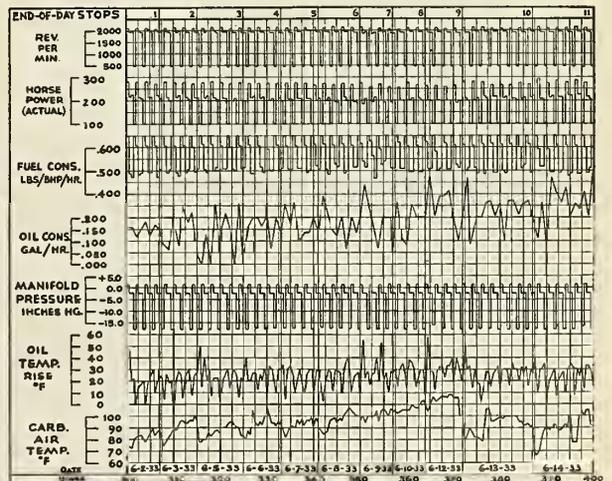
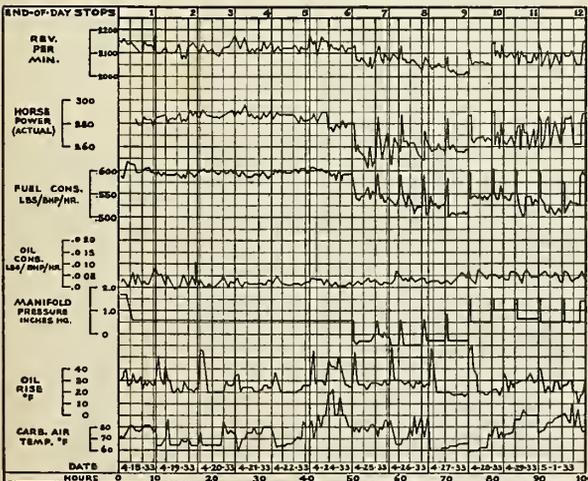
and the wear slight. The end gaps, which are the tell-tale of ring wear, were all still within the maximum allowable figure except in the case of three out of the 35 rings.

It has been concluded as a result of this test that 400 hours of dependable operation between overhauls is entirely practicable and that low overhaul costs are to be expected notwithstanding this increased operating period. Further, there is no fundamental barrier to longer operating periods, and we may look forward to improvements in exhaust valves and oil and air-cleaning systems which will permit 800 to 1000 hours between overhauls as routine service.

The graphic logs for the first and last 100 hours of the endurance test are shown below. For the first 100 hours, readings taken by the engine testers were plotted every half-hour as the test progressed. Trends in the variations of the reading are readily detected from these curves. Note that the first 50 hours was at wide-open throttle and the second 50 hours was in five-hour periods, consisting of one-half hour full throttle and 4½ hours cruising at 90% power. The rather large variations in r.p.m. at fixed-throttle setting were caused by starting and stopping of other engines in adjacent test tunnels, which affected the propeller of the endurance engine. The variation between different days is the normal effect of weather changes on the engine and propeller.

The graphic log of the last 100 hours represents flight service and is divided into two-hour periods, each consisting of 10 minutes wide-open throttle (take-off), one hour and 40 minutes at 74% power (1900 r.p.m. cruising) and 10 minutes idling (landing).

The oil consumption at the end of the test was well below the guarantee for a new engine, .025 lb./h.p. hour.



Graphic logs showing readings during the first hundred hours and last hundred hours of the 400-hour endurance test

AERONAUTICAL INDUSTRY

Four Days of Racing at Chicago

THE INTERNATIONAL Air Races, in the course of which the Gordon Bennett Balloon Race is scheduled to take place, will open September 1 at the Curtiss-Reynolds Airport, Chicago, Ill. The program will extend over four consecutive days and will include, besides the lighter-than-air event, airplane races, exhibition flying, parachute jumping and a series of official three-kilometer straight-away speed dashes for a world's landplane record. The meet is to be held under the auspices of *The Chicago Daily News* and the management of Clifford W. and Phil T. Henderson and will be the official air racing event in connection with A Century of Progress. Maj. James H. Doolittle will be honorary referee.

The heavier-than-air race program is similar to that arranged for the 1933 National Air Races. There will be one free-for-all each day for planes with engines of 200, 375 and 550 cubic inches of piston displacement or less. In addition, a race will be held for ships of the 1,000-cubic-inch class on the opening day, a women's unlimited free-for-all September 3 and the Frank Phillips trophy race, a 100-mile unlimited free-for-all, September 4.

This last race, the featured heavier-than-air event of the meet, will be flown over a rectangular course in full view of the grandstands and will be open to any type of aircraft, regardless of horsepower, that can show a speed in excess of 225 miles per hour in the qualifying dashes. Winner of this contest will receive permanent possession of the trophy and \$3,600 in cash. Second-place winner will be awarded \$2,000; third, \$1,200; fourth, \$800, and fifth, \$400. Also \$2,000 will be offered in lap prizes. Mr. Phillips, donor of the trophy, heads the Phil-

lips Petroleum Co.

Winners of free-for-all events for planes in the lower-horsepower categories, in addition to the daily cash prizes offered, will receive points through which the distribution of the sweepstakes awards will be determined. Winners of the daily parachute jumping contests also will divide a sweepstakes purse at the end of the show.

Shell Petroleum Corp. will be sponsor of the speed dashes in an attempt to break the world's landplane record. The company has posted a \$2,000 purse for this event.

The Pennzoil Co. will present an aerial high dive by "Spud" Manning, who will jump from a height of over 11,000 feet, falling to an altitude of less than 1,000 feet before opening his parachute. This company also will be sponsor of the performance of Johnny Miller, who will loop an autogiro. Stanavo Specification Board, Inc., will provide an escort from the West Coast for Lieut. Tito Falconi, Italian aerobatic flier, and Maj. Ernest Udet, German war ace and stunt flier, will also participate in the program. Mr. Phillips will bring a trio of motion picture stunt fliers to Chicago as his second contribution to the events. Other exhibitions will be given by Marine Corps and Army Air Corps squadrons.

The 1933 Gordon Bennett Balloon Race will begin September 2, weather permitting. This contest is the twenty-first held and the first for the fourth Gordon Bennett trophy.

Ten balloons were entered originally, but the withdrawal of the Swiss entry, due to the fact that the balloon was damaged in a recent flight and can not be repaired in time for the race, reduced the number. Ernest Demuyter, one of the Belgian pilots, also has withdrawn, having announced that his balloon, the *Bel-*

gica, is too old. The remaining eight entries include one Polish, two German, one French, one Belgian and three American teams, consisting of Army, Navy and Goodyear balloons.

Lieut.-Comdr. T. G. W. Settle, who won the international competition at Basle, Switzerland, last year, will pilot the Naval entry, assisted by Lieut. Charles H. Kendall; Ward T. Van Orman, five-time winner of the national elimination contests and the victor three times in the Gordon-Bennett meet, and Frank A. Trotter, winner of the 1930 national meet, will fly in the *Goodyear IX*, and Lieut. Wilfred J. Paul and Sgt. Joseph H. Bishop will represent the Army. The last two won the 1932 elimination contest and were to have represented the United States as one of the American teams in the international contest last year, but were prevented by lack of funds.

The French entry will be piloted by Georges Ravaine and Georges Blanchet, the Belgian by Philippe Quersin and Marcel Schelle, the *Deutschland* by Richard Schuetze and Dr. Erich Koerner, the second German Balloon by Fritz von Opel and Erich Deku and the Polish *Kosciuszko* by Capt. Franciszek Hynek and Lieut. Zbigniew Burzynski.

"Graf Zeppelin" Expected in Chicago

IT HAS BEEN REPORTED that the *Graf Zeppelin* will fly to Chicago, Ill., next month via South America. Leaving Germany October 14, the airship is expected to proceed from Brazil to the West Indies, Miami, Akron and Chicago. The return flight to Germany would be made directly from Chicago. Arrangements have been made by the Post Office Department for American mail to be carried on the *Graf Zeppelin* from Miami and Akron to Chicago and from Chicago to Europe. (Continued on following page)

Coming Events

Aeronautical exhibit at a Century of Progress Exposition, Chicago, Ill. Continued to NOV. 1.

International Automotive Engineering Congress under the auspices of the Society of Automotive Engineers at the Palmer House, Chicago, Ill. SEPT. 1-4, continued from Aug. 28.

International Air Races and Gordon Bennett Balloon Race at Curtiss-Reynolds Airport, Chicago, Ill., in connection with A Century of Progress Exposition. SEPT. 1-4.

Air races at Ottawa, Ohio. SEPT. 3.

Air show and dedication of airport at Price, Utah. SEPT. 4.

Centennial Air Races at Bow-

ling Green, Ohio. SEPT. 4.

Start at Paris, France, of French good-will tour of Europe under the leadership of Air Minister Pierre Cot. SEPT. 8.

Annual air meet of the Toronto (Ont.) Flying Club. SEPT. 9.

Essex Aviation Display at Hillman's Aerodrome, Romford, England. SEPT. 9.

First Annual Seattle Air Show at Boeing Field, Seattle, Wash., under the auspices of the Seattle Junior Chamber of Commerce. SEPT. 10.

Conference of Aeronautics Branch, Department of Commerce, and aircraft manufacturers, at Washington, D. C., to discuss proposed changes in air-

worthiness requirements for aircraft. SEPT. 14, postponed from July 27.

Air races at North Baltimore, Ohio. SEPT. 17.

Concentration of civilian aircraft in demonstration at College Park Airport, Md. OCTOBER.

National air treasure hunt, beginning at St. Louis, Mo., and ending at New York, N. Y., under the auspices of the U. S. Amateur Air Pilots Assn. and Bernarr Macfadden. OCT 3-7.

Air cruise of private planes from Washington, D. C., to New York, N. Y., in connection with National Charity Air Pageant. OCT. 7.

National Charity Air Pageant for sportsmen pilots, under the auspices of the Judson Health Center, the United States Ama-

teur Air Pilots Association, the Sportsman Pilot Association of America and the Emergency Exchange Association for the Junior League Chapters, at Roosevelt Field, Mineola, L. I., N. Y. OCT. 7-8.

Third annual meeting of the National Association of State Aviation Officials at the Hotel Stinton-St. Nicholas, Cincinnati, Ohio. OCT. 12-14.

German air sport exhibition at Hanover, Germany. NOVEMBER.

Second International Egyptian Aviation Meeting at Cairo, Egypt, under Aero Club of Egypt auspices. DEC. 18-24.

Thirty-second Annual Conference of the Fédération Aéronautique Internationale, at Cairo, Egypt. DEC. 20-29.



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THE above statement was made by Casey Jones, president of the Casey Jones School of Aeronautics, Inc., speaking for the faculty, in an announcement concerning the opening of this school nine months ago—before the New Deal. Our confidence has been justified by the splendid headway which has been made since that time.

Right from the start we have had many factors in our favor. Our faculty is composed of men with broad aeronautical experience, each man an expert in his particular branch. Our location in Newark, home of the world's busiest airport, gives the students the opportunity of making personal contact with the latest products of aviation. Our school building and hangar are modern; the equipment up-to-date and adequate.

In spite of these advantages, however, we could not have succeeded without the faith which our students expressed in their school and in the future of the industry which they soon will serve. They have responded with more than ordinary enthusiasm, to the extent that, within three months from the opening, we found it necessary to double our floor space and add an Aeronautical Engineering course.

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(Continued from preceding page)

Aviation Corporation Shows Profit

AVIATION CORP. and its subsidiaries for the six months ending June 30, 1933, showed a consolidated net profit of \$321,057, it has been announced. This compares with a loss of \$2,565,371 for the corresponding period of 1932. The consolidated balance sheet of the company and its subsidiaries as of June 30, 1933, reflected current assets amounting to \$11,154,945, of which \$9,738,282 was in cash, Government securities or the equivalent, while current liabilities amounted to only \$368,081.

Aircraft Makers' Conference Date Set

THE CONFERENCE with aircraft manufacturers called by the Aeronautics Branch of the Department of Commerce for the purpose of discussing proposed changes in the Airworthiness Requirements of Air Commerce Regulations for Aircraft has been definitely postponed to September 14, it was announced last month by Ewing Y. Mitchell, Assistant

Secretary of Commerce. The meeting is scheduled for 10 a. m. in the Department of Commerce Building in Washington, D. C.

Civil Service Technical Examinations

THE U. S. CIVIL SERVICE Commission, Washington, D. C., has announced that applications for the positions of senior engineer, engineer, associate engineer and assistant engineer in the Federal classified service will be received not later than September 28. Competitors for the four positions will not be required to report for a written examination but will be rated on their education and experience. Optional branches to which the positions will apply include that of aeronautical engineering.

South Dakota Kinner Dealer Chosen

RENNER Air Service Corp. of Renner Airport, Sioux Falls, S. D., has been appointed dealer for Kinner aircraft for the state of South Dakota.

Cord Declares Cash Dividend

DECLARATION of a dividend by the Cord Corp. of twenty cents a share cash was announced last month by L. B. Manning, executive vice president of the company. The dividend is payable Sept. 15, 1933, to stockholders of record at the close of business September 1.

North American Makes Six-month Report

E. R. BREECH, president of North American Aviation, Inc., recently announced that North American Aviation, Inc., and its wholly owned subsidiaries reported a net profit before depreciation of \$67,277.43 for the first six months of 1933, and a net loss of \$147,651.04 after deducting depreciation charges in the amount of \$214,928.47. The net loss, it was stated, would be reduced to \$104,756.50 for the first six months of 1933 if there were included therein North American Aviation's equity in the net profit of subsidiary not consolidated, in which a majority stock interest is held.

(Continued on following page)

. Digest of Recent Events .

Mattern Returns to New York

JAMES MATTERN, piloting a Lockheed from Toronto, Ont., arrived at Floyd Bennett Field, Brooklyn, N. Y., completing his journey around the world. Although his own plane had been wrecked a month earlier in Siberia, he was flown in other ships from Siberia to near Toronto, Ont., where he borrowed the Lockheed from Maj. E. E. Aldrin of Stanavo Specification Board, Inc. JULY 29.

French Planes Complete Annual Air Tour

OVER FIFTY planes finished at Buc the Third Annual Tour of France, organized by the Union des Pilotes Civils and the Parisian *Le Journal*. The itinerary covered about 2100 miles in ten days. JULY 30.

Women's Altitude Mark for Light Planes Set

HELENE BOUCHER, French pilot, set a new official women's altitude record for light planes by climbing to 5900 meters (about 19,364 feet) near Orly, France. Her plane, empty, weighed less than 450 kilograms and was powered with a 60-horsepower engine. AUG. 2.

German Student Establishes World's Glider Record

A WORLD'S RECORD for endurance flying in a glider was claimed by Kurt Schmidt, university student, who flew in a small sailplane, *Loerzer of Grunau*, near Koenigsberg, East Prussia, for 36 hours 35 minutes. AUG. 5.

World's Distance Record Made by French Fliers

AN OFFICIAL distance of 9104 kilometers (about 5656 miles), establishing a new world's record, was flown non-stop by Lieuts. Paul Codos and Maurice Rossi in a Bleriot monoplane, *Joseph Le Brix*, from Floyd Bennett Field, Brooklyn, N. Y., to Rayak, near Beirut, Syria. The flight was made in about 56 hours, their course extending over the Atlantic Ocean, France, and across Europe to Budapest, the Aegean Sea and Syria. The plane used in the flight is a Bleriot 110, powered with an Hispano-Suiza engine. The same ship was used in March, 1932, by Rossi and Lucien Bossoutrot to establish the world's closed-circuit distance record of 6575 miles. As a result of establishing the new record, Rossi and Codos, who have returned to France, will receive from the Air Ministry an award of about \$52,800. The new record supersedes the mark of 5341 miles formerly held by Squadron Leader O. R. Gayford and Flight Lieut. G. E. Nicholets of Great Britain. AUG. 5-7.

California Celebrates Aviation Week

ALL AIRPORTS in California joined in the observance of Aviation Week, under the auspices of the State Chamber of Commerce. AUG. 6-13.

Gliders Compete in German Meet

THE ANNUAL international gliding contests were held on the Wasserkuppe, Germany. AUG. 13-20.

Balbo Fleet Reaches Home

AIR MINISTER Italo Balbo led his fleet of Italian fliers from Shoal Harbor, Newfoundland, to Horta and Ponta del Gada, in the Azores, and thence to Lisbon, Portugal, Rome and Orbetello, the starting point for their trans-Atlantic formation flight. The weather delayed the take-off at Shoal Harbor to August 8, when the 1200-mile over-water hop to the Azores was made by the twenty-four Savoia Marchetti S. 55X seaplanes in a little over ten hours. Through the addition of mechanics, the personnel had been increased to 111 men. The 760-mile flight to Lisbon was made the following day in about seven hours; in the process of taking off for this hop the second serious accident of the long flight occurred, when one of the planes capsized. Following a flight of about 11 hours over the 1160-mile distance between Lisbon and Rome, Italy, on August 12 the fliers made a triumphal entry into the city, and two days later the twenty-three planes of the fleet returned to their base at Orbetello. Air Minister Balbo was given the title of Air Marshal, and each man in the crew of the flight was raised one grade in rank. The close of the flight at Orbetello marked the end of a 12,000-mile journey to Chicago and return, made in formation, in 45 days. AUG. 14.

Danish Expedition Discovers New Land

AN AERONAUTICAL exploration expedition in East Greenland, headed by Dr. Lauge Koch, is believed to have dis-

covered unknown islands in the Arctic Ocean between Svalbard and the Northeast Foreland as the result of a flight by Danish Naval planes of the expedition, it is reported. The flight started near the northeastern corner of Greenland, using as a base a ship of the expedition, which group also secured other important geographical and geological data.

AUG. 16.

Roosevelt Field Fliers Attend Canadian Pageant

DESPITE bad flying weather conditions, about twenty planes took part in the air cruise from Roosevelt Field, Mineola, L. I., N. Y., to the Canadian Air Pageant at Montreal, Quebec. Among fliers who participated in the cruise were Lieut.-Comdr. Frank Hawks and Mrs. Amy Johnson Mollison. AUG. 19-20.

Ship-to-Shore Flight Covers Over 700 Miles

CARRYING mail from the *Europa*, 707 miles off Ambrose Light, a plane piloted by Horst Schwilden flew to Brooklyn, N. Y., in 6 hours and 45 minutes. AUG. 23.

The Lindberghs Reach Denmark

FOLLOWING a month's exploration of Greenland and Iceland as a survey in preparation for a projected northern trans-Atlantic route, Col. Charles A. Lindbergh and Mrs. Lindbergh arrived in Copenhagen, Denmark. The flight was made in a leisurely manner from Iceland to Denmark via the Faroe and Shetland islands in a Cyclone-powered Lockheed Sirius seaplane. AUG. 26

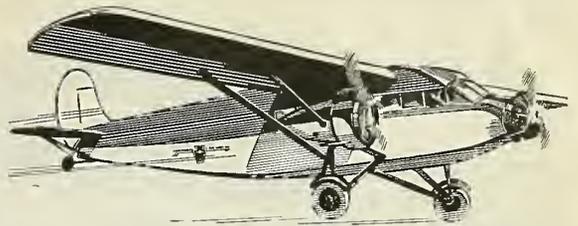
A NEW ISSUE OF STINSON PLANE TALK

(September)



Tells all about the **STINSON "RELIANT"** which is out-selling all two, four and six passenger cabin planes combined and other timely facts about new model and prices. Mailed free . . . postpaid

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Things Are Looking Up . . .

Aviation is sweeping ahead to new horizons and fresh triumphs . . . toward greater heights of service. Large investments made recently in the most up-to-date planes and equipment by many prominent airlines give ample proof of new progress to come. A great increase in man-power is following.

Nine Penn School Graduates were employed

by the aviation industry during July. This is an indication of the growing demand for Penn School trained men.

Rates Still Down

An aviation school nationally famous and backed by four years' experience as a fully approved Transport, Flying and Ground School offers you a rare opportunity to enter aviation at greatly reduced costs. Penn School, operated by the Pittsburgh Aviation Industries Corporation and affiliated with Pennsylvania Airlines, is in a unique position to train and advise you for a real career in aviation. No graduate has ever failed to pass the United States Department of Commerce flying tests.

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Flying Schools: Pittsburgh-Butler Airport
Allegheny County Airport





New Edo floats in use on an Aeronca C-3

(Continued from preceding page)

Aeronca C-3 on New Edo Floats

THE AERONCA C-3 on Edo floats has been licensed as a seaplane for over a year, but only recently have the newest approved Edo Model 1070 floats been placed in production. The accompanying illustration was taken while George B. Post, vice president of the Edo company, was flying the ship at the Edo base in College Point, L. I., N. Y., during some of the preliminary tests with the new floats.

Mr. Post flew this ship on a recent Aviation Country Club seaplane cruise and carried a passenger with him for 250 miles, without any favoring wind, on less than eleven gallons of gasoline at an average speed of about seventy miles per hour. The ship takes off from the water satisfactorily with two people, and with one person, at a fair breeze, it leaves the water in about 200 feet.

Aeronautical Manufacturing Code

THE AERONAUTICAL Chamber of Commerce of America, Inc., filed its code for the manufacturing branches of the industry August 4. Members of the Aeronautical Chamber of Commerce represented by the manufacturers' code form ninety-five per cent of the aircraft production in the United States, ninety-eight per cent of the active aircraft engine builders and nearly all the major accessory manufacturers.

The manufacturers' code prohibits employment of persons under 16. It provides that no worker shall be employed for more than an average of 40 hours a week for 52 weeks. The plants of the industry are open to capable workmen, without regard to their membership or non-membership in any organization. No member of the code will use another member's designs for aircraft, aircraft engines, parts or accessories without a definite licensing agreement providing for equitable compensation.

The manufacturers' code establishes rates of pay as follows: Minimum rates of pay, not less than 40 cents per hour, unless the hourly rate for the same class of work on July 15, 1929, was less than

40 cents per hour, in which case they shall be not less than the hourly rate on July 15, 1929, and in no event less than 30 cents per hour.

Accounting, clerical, banking, office, service or sales employees, except outside salesmen, are not to be paid less than \$15 per week in any city over 500,000 population, or in its immediate trade area; nor less than \$14.50 per week in any city of between 250,000 and 500,000 population, or in its immediate trade area; nor less than \$14 per week in any city of between 2,500 and 250,000 population, or in its immediate trade area, and in towns of less than 2,500 population wages are to be increased by not less than 20 per cent, provided that this shall not require wages in excess of \$12 per week.

The Aeronautical Chamber and the Policy Board of the N. R. A. have agreed that members of the manufacturing branches of the aircraft industry may sign the President's blanket code, with modifications, until the industry's own manufacturing code is approved.

The substitutions in the President's code, to be applied to the manufacturers of aircraft and engines, include: Factory labor 40 hours a week averaged over a 3-month period, with not more than 48 hours of labor in any one week; time and one-third pay for overtime for factory labor over eight hours in any one day; office help 40 hours a week averaged over a period of one month, with no more than 48 hours in any one week.

Government Buys Ceiling Projectors

AN ORDER for twenty-five ceiling projectors has been received by the Westinghouse Electric and Manufacturing Co. from the Federal Government through the Weather Bureau. The projectors will be installed in various Weather Bureau stations at airports throughout the United States and its possessions. The projectors are used to determine the height of clouds above the station. This information is immediately reported to a central bureau, which makes it available to both military and commercial flying services.

Official Data on Airplane Production

AIRPLANES manufactured in the United States during the first six months of 1933 totaled 669, of which 306 were for domestic civil use, it was announced last month by Ewing Y. Mitchell, Assistant Secretary of Commerce. The 306 airplanes built for civil use in this country during the period included 215 monoplanes, 84 biplanes and 7 autogiros. Of the monoplanes, 120 were open cockpit and 95 were cabin types. The biplanes included 26 open cockpit and 58 cabin craft.

Planes produced from January 1 to June 30 were classified as follows: 306 for domestic civil use, 212 for military delivery and 151, including civil and military, for delivery to purchasers in foreign countries.

The report is based on a record of Department of Commerce licenses, identification marks issued for unlicensed airplanes, and reports as to military and export production for aircraft manufactured between January 1 and June 30.

States Aircraft Corp. Moves to Texas

IT WAS ANNOUNCED last month that the States Aircraft Corp. of Chicago Heights, Ill., was locating in Center, Tex., and would resume the manufacture of the States monoplane as soon as shop equipment was set up.

New Fairchild Being Developed

FAIRCHILD Airplane Sales Corp., Hagerstown, Md., is building a fast new ship which it intends to add to the standard Fairchild line, it was announced recently. It is stated that the plane will follow closely the two-place, open-cockpit design of the Fairchild 22, but that it will be completely streamlined for maximum speeds. Powered with a Warner 125- or 145-horsepower engine, the plane is expected to have a speed range of 135-150 miles per hour.

Spencer Leech has been appointed as Fairchild dealer at Armonk, N. Y., and New Haven, Conn.

Trades Group Sponsors of Air Tour

THE FIFTH Annual All-Indiana Air Tour was held this summer under the auspices of the Indiana Aircraft Trades Association, for the purpose of promoting an interest in aircraft in the state.

Clarence Cornish, of Fort Wayne, won the silver trophy, gift of the Lincoln National Life Insurance Co., as the pilot who by his flying, attitude and judgment did the most on the tour to promote the safety of aviation.

Twelve Indiana cities were visited by the tour under the direction of Maj. C. E. Cox, Jr., president of the Indiana Aircraft Trades Association and superintendent of the Indianapolis municipal airport.

(Continued on following page)

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Use sheet metal products of recognized reputation and value for hangars, shops, sheds, culverts, and similar purposes. Specify AMERICAN Black Sheets, Keystone Copper Steel Sheets, Apollo Best Bloom Galvanized Sheets, Formed Roofing and Siding Products, Culvert Sheets, Special Sheets, Tin and Terne Plates. Write for full information and literature.

This Company also manufactures USS Stainless and Heat Resisting Steel Sheets and Light Plates for all purposes to which these products are adapted.

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No school today is as satisfactorily equipped to do so. The facts flown out of 55,000,000 miles of mail-and-passenger transportation, under all conceivable weather conditions; an affiliation with the world's foremost group of aviation industries; and a location on the Oakland Airport, a key-terminal of United Air Lines, are some of the advantages offered only by Boeing.

Get details from anyone who has attended the Boeing School, or mail the coupon below for your copy of the new Boeing Bulletin. Either way will enable you to make your own comparison between Boeing training and any other.

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Following the invisible beacon.....

"Between Omaha and LaPorte, Indiana, flew radio beacon for more than an hour without sight of ground. Radio in Beechcraft worked perfectly. In spite of this condition made trip in three hours and twenty minutes."

—pilot's report

Never before on airplane that combines so many desirable flying qualities as the Beechcraft—Comfort, Speed, Ease of Controls.

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WICHITA, KANSAS



AERONAUTICAL INDUSTRY

(Continued from preceding page)

China Orders Thirty-six Fighters

T. P. WRIGHT, vice president and general manager of Curtiss Aeroplane & Motor Co. of Buffalo, N. Y., recently announced the receipt of an order from China for thirty-six Cyclone-powered Curtiss Hawk single-seat fighters, amounting to \$1,000,000.

De la Cierva Receives Award

THE DANIEL GUGGENHEIM Medal for 1932 was presented recently at Chicago to Juan de la Cierva "for de-

velopment of the theory and practice of the autogiro."

Having already entered the field of aeronautics through his design and construction of a Spanish bomber in 1918, he began the development of the autogiro principle in 1920. During 1921 and 1922 two different machines were built and tested. A series of successful flights embodying the autogiro idea were made in January, 1923, at a Spanish airdrome. After two more years of experimentation an autogiro was demonstrated in England, and the Cierva Autogiro Co., Ltd., was formed, for which he has continued to act as technical director.

CHECK THE SALES MACHINE

(Continued from page 22)

biles, 80% of phonographs, 75% of radios and 80% of washing machines and vacuum cleaners are sold on time payments. When, Oh Lord of Aviation, will your faithful followers be freed from bondage under the harsh laws of the C. O. D.!

Hitting on All Sales Cylinders

To sell successfully, then, we shall (1) Price for Profit, (2) Schedule production in advance, (3) Establish a definite sales quota, (4) Select dealers with discrimination, (5) Train dealers intensively and then back them to the limit, (6) Give more thought to display and demonstration, (7) Maintain constant study and research of sales methods and be prompt to change for the better.

Until the NRA-ists take over the rest of the country, Business must still look to the salesman—and the way of the aircraft salesman is hard. It has not been made easier by the 50-hour ruling for private flyers, by onerous and burdensome regulations affecting the semi-annual inspection of planes old and new without discrimination, by archaic nuisances attending the renewal of licenses.

The salesman needs all the help and succor that the manufacturer can provide whether he be a member of a dealer organization or one of the manufacturer's own sales staff. The sales manager will recognize the importance of remaining in the field during the selling months. He must stimulate the salesman, less by old-fashioned inspiration than by showing him *how to sell*. He will not hesitate to advise low pressure selling to prospects who cannot be forced to buy now. Unremitting sales research will be employed to weigh and test every likely idea, for no man can prejudice sales methods.

Give the Sales Director Full Powers

Many key executives in aircraft companies are more engineering- and production-minded than sales-minded. They think of airplanes as *things to be made*. If progress sales-wise is to be achieved in the private market, there must be executives of at least equal importance who are sales-minded, who think of airplanes as *things to be sold*. If your organization lacks such a man, go out and get him. Don't just "hire a sales manager." Make him your president or executive vice president. Then you will be more likely to produce what the public wants instead of what you would like to make. And you will develop a sound and vigorous sales policy.

No, we're not belittlin' the engineer. Not as we read reports of Juan de la Cierva's new baby 'giro, which "can be sold for less than \$1,500 and kept in an ordinary garage." Ho hum!

BEN HOWARD

Wins WITH WAX



Gathers in most of money
at Los Angeles National
Air Races with "Mike," his
Johnson-Waxed
"Howard Special"

Says the winner of four 1sts, one 2nd and one 4th: "The results I got from waxing my ship with your Johnson's Wax were rather startling. The top speed was noticeably increased as well as an increase in R. P. M. of the motor after waxing the propeller.

- "It also makes a cinch of keeping a white aeroplane white, which ordinarily is quite a job. Nothing seems to stick to the waxed surface. All we had to do was to wipe off the surface with a rag and it would take off oil, dirt and exhaust stains, leaving the ship as clean as it was before the race.

- "Can assure you that "Mike" will be sporting a shiny coat of Johnson's Wax when we show up at Chicago for the International Air Races in September."

LOOK FOR THIS SIGN. It signifies an authorized Johnson Waxing Station. Have a corner of a wing waxed and see what a tremendous difference it makes. Send in coupon for generous free sample.

DEALERS: Airports, hangars, schools interested in hearing about dealer opportunities, write S. C. Johnson & Son, Inc., Racine, Wis., for full details, samples, etc.



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Please send me a free sample of your cleaner and wax for airplanes.

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Address in full _____

TRADE LITERATURE

Diesel Indicator Valves

• BACHARACH Industrial Instrument Co. has issued Bulletin 1267, descriptive of Maihak indicator valves for Diesel engines. Illustrated with a picture of the valve, part of which is cut away to show the interior construction, the pamphlet explains the operation, design and advantages of the valve.

Privateer III Amphibion

• AMPHIBIONS, INC., has published a folder on their product, the Privateer III. General descriptions of the plane and its qualifications are followed by detailed data covering the hull, cabin, wings, landing gear, controls and engine installation. Specifications and performance figures also are given. The pamphlet is illustrated by several photographs of the ship in flight, on the ground and in the water and of various parts of the plane. A line drawing of the plane accompanies the table of specifications.

Seamlex All-Metal Hose

• VARIOUS TYPES of Seamlex flexible seamless aluminum tubing, which was described in the August AERO DIGEST, are illustrated and described in Bulletin

No. 311, issued by the Seamlex Corp. In addition, the leaflet discusses the principal parts of the hose and their applications for various uses.

Colloidal Graphite Lubrication

• THE ACHESON Oildag Co. has issued Technical Bulletin No. D102, dealing with the lubrication of small mechanical devices with colloidal graphite. This is one of a series of bulletins published by the company on the subject of colloidal graphite lubrication.

Cable for Airport Lighting

• A FOUR-PAGE descriptive leaflet entitled "Armortite Cable" has been issued by the Westinghouse Electric and Manufacturing Co. This underground cable for airport lighting is fully described in the publication in regard to application, construction and installation.

Aeronca Planes and Engines

• IN AN ATTRACTIVE booklet entitled "The Aeronca," the Aeronautical Corp. of America presents instructive and interesting discussions of the Aeronca, its most recent models and their various uses. A section that is of special interest

to many private fliers is entitled "Flying Clubs—How to Organize and Operate." This describes a method of forming and conducting a flying club with low-cost flight training and practice. The section enters a detailed discussion of the cost of operation and also refers to ways of augmenting the income of the club.

A section prepared for the professional pilot relates to earning money by flying and discusses student training, passenger hopping and miscellaneous flying, with estimates of finances involved in each field.

Most of the remainder of the booklet is concerned with the Aeronca and its uses. Models which are pictured and described include the open and closed Collegian two-seaters, the de luxe single-seater and the E-113A engine.

Bellanca Aircruiser Planes

• THE MOST RECENT circular on the Bellanca Aircruiser published by Bellanca Aircraft Corp. gives interesting information regarding the Transport Aircruiser, the Airbus and the Cargo Aircruiser. Performance and specification figures for all three types are set side by side in adjacent columns, aiding comparisons, and interior and exterior illustrations of the Aircruiser are shown.

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Mr. Cooper's letter reads in full:
"On completing my Limited Commercial Course in your school, I immediately secured a position with the Council Bluffs, Iowa, Airways. Later I was fortunate in securing a position with the Chicago Tribune, delivering their newspapers to Minneapolis by air. I attribute my success to the high class training received in your school. I am firmly convinced that aviation holds a wonderful future to the young man who secures high class training such as he can get in your school."—MORRIS COOPER.

Government Licensed Instructors. Government Approved School. Unexcelled equipment. Training includes blind flying, cross country, acrobatics, master mechanics, airplane and engine course. Big opportunities in both Central and South America as well as in U. S. Aviation courses taught in either English or Spanish. Write now. State age.

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Morris Cooper, another Lincoln graduate who found that Lincoln's high class training meant success.

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TRADE MARK with the Thumb Screw



Rust Proof, trouble proof, and a tight connection all the time.

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Aeronautical Engineer Master Mechanic
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Classes begin September 18th

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FOREIGN NEWS IN BRIEF

Canada

The Canadian Flying Clubs Association was sponsor of an air tour of the maritime provinces during the last two weeks of August. Over twenty airplanes took part, their itinerary calling for a visit to every licensed airport in the three eastern provinces. A feature of the air pageants given by the tour was the tied-together formation stunting by a trio from the Toronto Flying Club.

China

Three thousand combat airplanes of various types will be placed in service in China within the next three years, according to plans of the Nanking Government, it is reported. The action will be taken as a result of China's realization of the need of aeronautical aid in national defense.

Cuba

Airplanes played a prominent part in the Cuban crisis last month. Among important missions in this connection for which they were used were the transportation of Dr. Orestes Ferrara, Cuban Secretary of State, from Miami, Fla., to Havana on August 9, as the crisis was assuming serious proportions; the quick conveyance of important papers regarding the Cuban situation from Washington, D. C., to the Summer White House at Hyde Park, N. Y.; the rescue of Ex-President Gerardo Machado and four of his official aides, who were carried in a chartered plane from Cuba to safety in the Bahama Islands on August 12, and the flight of Dr. Ferrara and his wife in a Pan American Airways plane to Miami on the same date.

France

It has been announced that M. Roume, president of the board of directors of Air Orient, has become head of the board of the new union of French subsidized air transportation services, the name of which is Société Cen-

trale pour l'Exploitation de Lignes Aériennes. Shares of the organization will be distributed in the proportions of fifty per cent to allied interests such as railroad and navigation firms and banks hitherto identified with the five individual air services composing the group, twenty-five per cent to the government and twenty-five per cent to the constructors.

WEEKLY air mail flights between France and South America are scheduled to begin next April, according to a recent report. The regular service will be preceded by further test flights by Jean Mermoz, trans-Atlantic flier, whose next flight over the route is planned for December in his Couzinet, *Arc-en-Ciel*.

A GOOD-WILL flight around Europe by a group of civil and military fliers under the leadership of Air Minister Pierre Cot was authorized last month by the French Government. The flight is scheduled to leave Paris September 8.

MEN who will take part in a proposed mass airplane flight around French Africa next month are scheduled to enter training at Istres airdrome September 1. The planes will fly over a route of about 15,600 miles in the course of the tour.

Great Britain

Three troop-carrying biplanes are detailed to make a formation flight of 12,000 miles from Cairo, Egypt, across western Africa to Bathurst and Dakar. Their route will go south as far as Khartoum and thence westward over French Equatorial Africa, Nigeria, the Gold and Ivory coasts, Sierra Leone, the Gambia and Senegal.

The formation, selected from the equipment of No. 216 Squadron of the Royal Air Force, which is stationed at the Heliopolis airdrome under the command of Wing Comdr. C. W. Mackey, is scheduled to begin the flight October 14. Two months later they will return to Cairo.

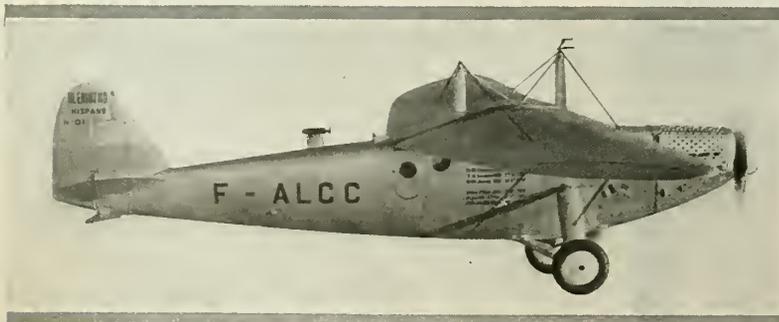
The cruise will be part of the routine activities of the Middle East Command of the R. A. F. The planes used will be Vickers Victoria biplanes, each powered with two Napier Lion 530-horsepower engines. Twenty-two fully armed infantrymen can be carried in the cabin of each of these planes, which have a normal cruising range of 770 miles.

LARGELY for the convenience of business men who are making a regular use of air transport to and from the continent, an experiment is being tried by Imperial Airways in the issue of "Season Travel Vouchers," which take a form similar to a banker's letter of credit. Any passenger flying frequently by the continental routes of the airline can obtain a season travel voucher available for four to twelve months. Tickets as required will then be issued against this voucher at any of the airway's offices, the necessary entries being made on the voucher. Such a voucher gives a substantial discount from the usual fares. The vouchers are sold in multiples of £100 face value.

CENTRAL AIR PORTS, LTD., a recently formed company in London, is planning an elevated airport for the center of the city, to cost approximately \$17,110,500. The airport, which is to be located 120 feet above ground level, will be supported by large buildings, including warehouses and aircraft hangars. Built in the shape of an eight-spoked wheel, half a mile in diameter, the airport will be illuminated for night use. Airplanes will descend from the runways into the supporting buildings by means of elevators, it is planned.

BRITISH-BUILT aircraft have been granted an official distinguishing mark—a lion rampant in gold within three rings of red, white and blue. Within the white ring are inscribed the words "British Certificate of Airworthiness." The mark, which has been registered under the Trade Marks Act, will at once distinguish British-built airplanes, regardless of what nation's registration markings they bear. No fee is required for the authorization, and constructors and owners of flying machines which are eligible are invited to apply to the Air Ministry.

TWO NEW MEDALS, to be known as the British Gold Medal for Aeronautics and the British Silver Medal for Aeronautics, have been founded by the Royal Aeronautical Society. The medals will be awarded for an achievement leading to advancement in aeronautical science and will be confined as far as possible to British Empire subjects, but others will not be excluded.



Acme photo

Hispano-Suiza-powered Blériot 110, which last month established a new distance record

The first awards of the British Silver Medal for Aeronautics have been made to Capt. C. F. Uwins, for reaching a world record height of 43,976 feet in a heavier-than-air craft on Sept. 16, 1932, and to Squadron Leader O. R. Gayford and Flight Lieut. G. E. Nicholetts, who flew from Cranwell, England, to Walvis Bay, South West Africa, non-stop, on Feb. 6-8, 1933, a distance of 5,340 miles.

A LONDON-GLASGOW, Scotland, run has been instituted as a week-end trip by Imperial Airways. The trip of 400 miles is made in about 3½ hours. It is timed to connect with air expresses to the continent.

SPARTAN AIR LINES has opened a regular twice-daily service between London and the Isle of Wight following a period of experimental week-end operations. The fastest train and boat service to the island occupies 2½ hours, while the Cruiser cabin monoplanes of the airway, powered with three Gipsy III engines, enable the traveler to reach the island in 100 minutes, forty-five of which are consumed in the motor coach journey from the airways terminus at Victoria to Heston airport.

A NEW GROUP of powerful radial air-cooled engines, the "Pegasus" Series II group, is now in quantity production at the works of the Bristol Aeroplane Co. Better cylinder and piston design has permitted an increase in compression ratio with corresponding improvement in power output and fuel economy without adoption of fuel of higher standard.

The engines have successfully completed the Air Ministry type tests of 100 hours' running, and have been granted full official approval for installation in military and civil airplanes. Construction details in which the Series II engines differ from their predecessors are a considerable increase in diameter and stiffness of the crankshaft, larger crankpin and crankshaft main bearings, and an arrangement which provides a certain amount of flexibility and relieves the rear cover of the engine of all loads imposed on the crankshaft itself.

The Series II engines are built in two main types, one with medium-ratio and the other with a low-ratio supercharger. The first, the Pegasus II-M2 and II-M3, delivers a normal 580 h.p. at an altitude of 5,000 feet, with maximum output of 630 h.p. at 6,000 feet. The second, the

Pegasus II-L2 and II-L3, develops 605 h.p. at normal engine speed at 2,000 feet and maximum power of 655 h.p. at 2,500 feet.

A PLAN for coastal services in west Scotland, the outer Scottish islands, and to and from the Isle of Man has been developed. Saro Cloud flying boats, each deriving power from two Armstrong Siddeley 340-horsepower Serval engines, have been acquired for the work.

Mexico

President General Abelardo L. Rodriguez has approved plans for a solo good-will flight this fall between Mexico City and Seville, Spain, by Francisco Sarabia. The flight is to be under the auspices of various high federal and state government officials. Plans call for a non-stop hop of about 5300 miles to be made in the course of the flight.

Sarabia, who was educated in the United States and is a graduate of the Aeronautical Service School, Chicago, has been flying for nine years and has a record of 4600 hours in the air without an accident. He holds the national passenger-carrying record.

A MINISTRY of War and Marine commission, headed by Capt. Miguel Colorado, has gone to Buffalo, N. Y., to acquire seven Fleet jobs to be used for practice, observation and training flights by aviation cadets of the Federal Army. The Ministry has intimated that when delivery is taken of the Fleet jobs it is possible that it will send representatives to interview other American aircraft manufacturers regarding the purchase of other types of planes.

MEXICAN AIRWAYS that connect with American aviation services have announced a considerable increase in business this summer between Mexico City and New York City in view of the fact that air schedules enable the travelers to negotiate the journey in approximately twenty-nine hours. The Mexican Aviation Co., Pan American subsidiary, is booking passengers from Mexico City directly into New York City in 29 hours and 35 minutes.

JOSE CRUZ Y CELIS, president, and Francisco Coudurier, secretary, of the Confederación de Cámaras de Comercio de los Estados Unidos Mexicanos, have

formally accepted and notified the member Chambers of Commerce of that body throughout the Republic of an offer conveyed by the Railway Express Agency Air Division to aid Mexican business and industrial interests in obtaining contacts with American importers and exporters seeking to develop commercial relations with Mexican houses.

Under the offer any Mexican business man who is an accredited member of a Chamber of Commerce in the United States may apply for lists and full information directly to the Railway Express Agency general offices in New York City or to any local office or representative in Mexico of the Wells Fargo & Co. Express, the National Railroads of Mexico Express Department or the Pan American Airways System. With all three of these organizations the Railway Express Agency maintains close connections in both air-express and rail-express traffic under through routing and rating arrangements.

A SEMI-WEEKLY passenger, mail and freight aviation service has been established out of Tuxtla Gutierrez, capital of the southern state of Chiapas, to the principal towns in that commonwealth and those over the border in Tabasco state, by Francisco Sarabia and his brother, according to the aviation department of the Ministry of Communications and Public Works. A feature of this service is the transportation by plane of coffee from the plantations in remote regions to the centers of distribution.

South America

A recent decree provides for the establishment of an aviation corps of the police service in Peru. The organization will include ten pilots and six mechanics, the personnel to be chosen by competitive examination and trained at the Jorge Chavez aeronautical school.

THE BRAZILIAN Government has authorized an air service from Para to Manaus, extending over about 900 miles of the Amazon River. It is desired to offer a five-year contract to a domestic company for the service, it was announced recently. At least one round trip each week will be required, in return for which the Government will provide a subsidy of about forty cents per mile.

STANAVO



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REVIEWS OF BOOKS

The Far Horizon

By Henry Wysham Lanier

• BIRGER JOHNSEN, flier of many and varied experiences, is the central figure of about twenty years of adventure, invention and development on the air frontier in "The Far Horizon," his life story. Told in the first person, this quasi-autobiography opens with Johnsen's departure for technical school in 1911 and follows his life in and out of aviation up to the present.

Many lands form a background for the story by Henry Wysham Lanier, beginning with Birger Johnsen's native Norway. Happy-go-lucky barnstorming, stunt flying for the moving pictures, flying for a Florida bootlegger, air observing for the Irrigation Service and wild duck chasing were a few of his aeronautical jobs, described with interesting details and anecdotes. Others included payroll delivery by airplane in Mexico, where he also flew the President's son to safety from threatened danger in a revolutionary district and was later forced to transport a revolutionist general to his destination.

In China, where he was engaged as a transport pilot, he was captured by pirates and at another time barely escaped death at the hands of a dope ring. Gold

hunting from the air and transporting a dangerous adventurer in disguise were diversions from the routine tasks of being an airline pilot in South America.

Multiple-Lens Aerial Cameras in Mapping

By the Technical Staff of the Fairchild Aerial Camera Corp.

• WRITTEN by men who had a large part in developing the equipment, "Multiple-Lens Aerial Cameras in Mapping" is an authoritative discussion of the practical application of these devices. Fundamental in treatment and simple and concise in wording, the book explains the principles of the camera and covers many practical and economic factors in the compilation of maps by its use. The treatment of the subject was planned especially for the engineer, bringing out points that will enable him to know when, how, with what results and how economically this method may be applied to securing map data. The book is especially timely in view of the fact that the photographing of 8,039 square miles of Massachusetts by means of one multiple-lens aerial camera was recently completed in four days.

The theory of photography is reviewed briefly, leading into a consideration of

aerial photography problems. A wide range of practical details is given regarding the use of the multiple-lens aerial cameras in meeting these problems. Production of the photographs and their conversion into maps for various engineering needs are discussed. One section covers economic factors, showing what may be accomplished in saving flying photographic time, control, compilation procedure and related problems. The last chapter includes information to help the reader to take an active part in the planning or direction of aerial mapping missions.

Simplified Aerial Navigation by Dead Reckoning

By Lieut. J. A. McMullen

• CROSS-COUNTRY FLYING and the magnetic compass are the two chief topics of discussion in "Simplified Aerial Navigation by Dead Reckoning." The book was originally written as a lecture series given to Royal Air Force pupils in 1918, and its style is simple and clear. Lieut. J. A. McMullen, the author, was a navigation instructor in the R. A. F. from 1917 to 1919 and is now owner and pilot of an autogiro.

In the section devoted to the magnetic compass, the author describes not only types and construction of the compass, but also natural laws relating to it.

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CITY and STATE..... 9-33

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ADVENTURERS ON PARADE

(Continued from page 16)

jog over to the Paramount Theatre where a lost aviator named Jimmie Mattern was on display. As Jimmie didn't get all the way around in the same airplane, the theatre hit upon the dramatic idea of painting a wrecked airplane on a back-drop and having Jimmy stagger around in front of it, showing how dazed he was not only after the crash, but even then. As a pantomime act Jimmy isn't so hot. However, when he came out of the fog and went through the questions and answers of the announcer, he was all right. Nobody expected him to be a John Barrymore, anyhow; so long as he stood up and spoke, the crowd got its money's worth.

The flying Mollisons, as you know, had tough luck. They crossed the Atlantic in a slow ship, and it took so long that Jim and Amy were both worn out. Too bad, after that long grind across the ocean, that they didn't make New York. Instead of opening at the Paramount, they opened at Bridgeport, a try-out town for shows before they hit Broadway. They put on Jimmy Mattern's Paramount act in a Bridgeport marsh, but they had only a small audience, and their notices weren't good. New York appreciated the Mollisons' courage and gave them a grand welcome. I hope they make the Music Hall on their next flight and earn enough to buy a fast airplane.

Various earnest and serious souls, such as editorial writers and technical experts, whom God preserve for they are the salt of the earth, always see in these daring flights some aeronautical advancement that is not apparent to me. The advancement is there all right, but it was there long before the flight. Of course the sensational chase around the globe with the Sperry Automatic Pilot called the subway crowd's attention to the fact that there was such a thing in existence; but it was here anyhow, and we all knew about it in aviation. What I'd call real progress would be for the crowd to demand that the engineers who invented that and all the instruments and perfected the engine, should get out on the stage and take five bows a day. But nobody thinks of them; they'll have to fly around themselves, or kill a lion in a pit on a snowy day before they get even honorable mention.

I'm not complaining, but merely pointing out that human nature is essentially the same as it was 3,000 years ago, and probably 3,000,000 years before that. I imagine, for instance, that when some very Early Stone Age Dr. Michael Water designed and manufactured a stone spear for sticking dinosaurs that the person whom the crowd shouted for was not the inventor, but some lower-browed

cave man named McClusky MacSwatt, who actually went and shoved the invention into a member of the species *dinosauria*—and the bigger the better. And he remained a world champion, appearing twice daily at the local opera house, until someone else carved up a *Gigantosaurus* and took the title and the plaudits of the throng away from him. This is known as Progress.

Speaking of Progress naturally reminds me of its opposite, Retrogression. And from there it is only a step to Hiram Bingham, another performer who has been in the public eye. In fact, he's sort of stuck in their crop, and they can't get him up or down. He's on the outs with the Chicago racing group; and he isn't in with the Los Angeles boys, either. You see, while he was monkeying around trying to decide whether or not to sanction Chicago, Los Angeles got in his hair for even considering the matter when he already had promised them protection. So now he revels in a universal popularity only equalled by that of the small, striped, bushy-tailed animal that inadvertently joined the garden party.

What was worse, they had a man detailed to see that he didn't get near a microphone to make speeches; and Hiram bereft of his microphone is like a body without a soul—or, to put it more accurately, a heel without a sole. People who came face to face with him pretended that nothing was in front of them. They didn't give him a ticket to the banquet, but when he got in they didn't invite him to sit at the speaker's table; he was poked off in a corner near the kitchen, in a draft. There's only one thing he can do now to win popularity: make a world flight, get lost in the Arctic, and STAY lost.

PERSONAIRLITIES

(Continued from page 39)

the owner of the house eating breakfast. That is to say, he *had* been eating breakfast. But the shocking sounds of Ben's arrival via aircraft had practically paralyzed him. He sat speechless with a piece of bacon poised midway between the plate and his face, on which rested an agonized look and a bit of egg.

"Good morning," says Ben. "I just dropped in to see if I could rent a concession here. I'll hire this place, as is, for two months, and pay for all damages caused by my visit." Still dazed, the owner agreed. The place was within seventy-five feet of a main traveled road, and thousands passed there daily. Ben put up a sign telling of the disaster, charged a dime admission, and in two months had paid for the damages, the concession and the Jenny, and cleared \$1,200 net. In proof of all this he sends me a yellowed newspaper clipping and offers to give instruction in crashing correctly.

REORGANIZATION

(Continued from page 13)

geles, Calif., and Oakland, Calif. A Department of Commerce airline inspector and a Department of Commerce airline maintenance inspector will be located at each with the exception that no maintenance inspector will be located at Cleveland, but one will be based at Atlanta, Ga. Airline inspectors will be concerned with flying operations, competency of flying personnel and general safety factors involved in airline operation. Airline maintenance inspectors will be responsible for checking airworthiness of aircraft used by the airlines and for examining methods of maintaining and repairing flying equipment.

The relatively small reduction in personnel which accompanies the change in operating procedure is due chiefly to the fact that the necessary economies could be made elsewhere.

Positions in the Air Regulation Service which have been abolished are: Three chief inspectors in the Inspection Service, Chief of the Licensing Division, three aeronautical inspectors, one trimotored airplane pilot and three clerical positions. George E. Gardner, formerly a chief inspector, becomes Chief of the Inspection Service, with direct supervision over the functioning of the Inspection Service as a whole. Joseph S. Marriott, formerly a chief inspector, will be Supervising Aeronautical Inspector at Los Angeles. Charles A. Rowe, formerly Supervising Aeronautical Inspector at Los Angeles, has been transferred to a similar post at Dallas, Tex. C. A. Charles, formerly Supervising Aeronautical Inspector at Camden, N. J., and R. I. Hazen, formerly Supervising Inspector at Dallas, become school inspectors. Eight inspectors will be furloughed without pay pending a determination of the savings effected in travel and other costs.

The Inspection District headquarters and the bases of aeronautical inspectors will be tentatively located at:

Roosevelt Field, L. I., N. Y.; Albany and Buffalo, N. Y.; Hartford, Conn.; Boston, Mass.; Newark and Camden, N. J.; Wilmington, Del.; Washington, D. C.; Pittsburgh, Pa.; Los Angeles, Santa Monica, Burbank, Bakersfield, Fresno, Oakland and San Diego, Calif.; Albuquerque, N. M.; Atlanta, Ga.; Nashville, Tenn.; Jacksonville and Miami, Fla.; New Orleans, La.; Detroit, Mich.; Cleveland, Columbus and Troy, Ohio; Indianapolis, Ind.; Chicago, Ill.; Minneapolis, Minn.; Milwaukee, Wis.; Davenport, Iowa; Fargo, N. D.; Kansas City and St. Louis, Mo.; Omaha, Neb.; Denver, Colo.; Dallas and Houston, Tex.; Tulsa, Okla.; Little Rock, Ark.; Salt Lake City, Utah; Portland, Ore.; Seattle, Wash.

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1. Boeing literature concerning the "247" is available to airline operators and other users of large aircraft. (Page 37)
2. Sportsman pilots as well as commercial operators will find the Bellanca Aircraft literature interesting. (Page 25)
3. Private fliers and operators of high-speed aircraft—write for the Beech Aircraft catalog. (Page 57)
4. The Curtiss-Wright "Condor" catalog is available to foreign and domestic air transport operators. (Page 31)
5. Commercial operators—when writing for Douglas' catalog, please clip the coupon to your letterhead. (Page 6)
6. Private and commercial aircraft operators in the market for a four-place cabin plane are invited to write for details of the Stinson "Reliant." (Page 55)
7. Waco has an interesting booklet completely describing, for potential aircraft owners, the three popular Waco models for 1933 (Page 63)

ENGINES

8. Pratt & Whitney's booklet describes for engineers, aircraft builders and operators, the salient points of "Wasp" and "Hornet" engines. (Second Cover)
9. Airlines, commercial operators and engineers are invited to write for the literature describing Wright liquid- and air-cooled engines. (Page 23)

EQUIPMENT

10. For aircraft finishing information, see Berry Bros.' catalog of colors and finishing suggestions. (Page 59)
11. Dealers and all users of aircraft are invited to send for literature concerning B. G. Spark Plugs. (Pages 2 and 3)
12. Aeronautical Engineers—you will find the Eclipse Starters and Generators literature very helpful. (Back Cover)
13. Buyers of aircraft spark plugs, get Hurley-Townsend's interesting little booklet. (Page 63)
14. The Sperry Gyroscope Company's booklet is available to aircraft owners in the market for blind flying instruments. (Page 35)
15. Valves—for new engines or for replacements—are described in the Thompson literature for engine builders and repair stations. (Third Cover)
16. Repair stations and aircraft and engine builders—write for Wittek's literature

on "the hose clamp with the thumbscrew." (Page 59)

RADIO

17. If you're thinking of buying an aircraft radio, write for the Westport booklet. (Page 32)
18. R C A - Victor, one of the world's largest builders of radio equipment, offers private and commercial aircraft operators literature describing the newest in aircraft radio. (Page 1)

SCHOOLS

19. For expert ground or flight training, write for the Boeing School literature. (Page 57)
20. Prospective students, write for the Dallas school catalog and schedule of low prices. (Page 7)
21. For mechanics and aeronautical engineering courses, send for the Casey Jones School literature. (Page 53)
22. The Lincoln School invites you to write for their catalog of ground and flying courses. (Page 59)
23. "Skyward Ho!" is the name of the Parks Air College booklet available to prospective aviation students. (Page 5)
24. The Penn School of Aviation invites pilots- and mechanics-to-be to write for their catalog of courses and tuition. (Page 55)

25. Training at San Diego is described in the Ryan School of Aeronautics literature. (Page 9)
 26. The Spartan School's booklet describes the thrilling student flights during the tours of "The Dawn Patrol." (Page 33)
 27. Tri-State College offers literature outlining its two-year course in aeronautical engineering. (Page 67)
 28. The Aeronautical University, Chicago, offers complete literature describing their various engineering, mechanics, administrative, radio and flying courses. (Page 59)
- ## MISCELLANEOUS
29. The Air Line Pilots Association has on file a list of experienced line pilots. Aircraft operators, please write. (Page 69)
 30. American Sheet & Tin Plate's literature contains interesting data for those who plan the construction of hangars, shops, sheds, culverts, etc. (Page 57)
 31. Waxing will preserve your plane. Send for the Johnson's Wax booklet telling how and why. (Page 58)
 32. Ronald Press Company offers a plan on how to purchase their technical books on deferred payments. (Page 72)

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SPORT BIRD: 4-place, custom built. 125 h.p. Kinner. Steel propeller, Heywood starter, balloon tires, brakes, landing lights and equipped for blind flying. Never cracked up. Motor recently overhauled. \$2,000 cash. Flyaway Norfolk, A. L. Cobb, 1319 N. Brandon Avenue, Norfolk, Virginia.

MONOCOUE 90, Lambert, guaranteed 115 actual hours; wheel pants, ring, electric starter, steel propeller, extra instruments; beauty; really new; cost over \$4,000; rare bargain, \$1,495, absolutely no less. Licensed August 1934. Jones Repossessed Car Sales, 121 Alexander Street, Rochester, N. Y.

J-5 TRAVEL AIR: Air wheels, brakes, metal prop; still relicensed; trade for Waco F or cheap for cash. Roger Mensing, General Delivery, Delphos, Ohio.

WACO CABIN: 1932 model; excellent condition; look like new. Extras including steel propeller, leather upholstery, shielded for radio. Special paint job. Finished in red, black trimmed. Hugh C. Robbins, Waco Distributors, Cleveland Airport, Cleveland, Ohio.

PACKARD DIESEL STINSON JR.: R. C. A. radio. Blind flying instruments. Night flying equipment. Beautiful condition. New fabric. Finished red and silver. New upholstery in red Spanish leather. \$2,500. Sundorpha, Cleveland Airport, Cleveland, Ohio.

\$575: Hisso Eaglerock; 153 hours, wing recovered, otherwise refinished, like new condition, never damaged. Compass, turn-bank, duals. Licensed September 1934. Eaglerock Distributors, 250 Franklin, Buffalo, New York.

STINSON SR.: 330 h.p., model SMIF, like new. Stinson Lycoming. In A-1 condition, night flying equipment. Travel Air; J6-5, model E-4000, like new. Lincoln Page: OX-5 motor and ship like new. Central Air Service, Battle Creek, Michigan.

WACO F-2: 165 Continental; ring, pants, full night equipment. Ship like new, 90 hours total time. Will trade. Walter Hartman, Bettis Airport, Dravosburg, Pennsylvania.

WARNER FLEET: Cannot be told from new. Has 140 hours. Semi-air wheels and brakes, Heywood starter, instruments in rear cockpit, steel prop; \$1,675. Welch Flying Service, Rochester Airport, Rochester, New York.

WACO F: Warner 125 h.p.; steel prop. 425 hours; 150 hours since last overhaul. In A-1 condition and recovered; has high gloss finish. January 1933. \$1,750. Welch Flying Service, Rochester Airport, Rochester, New York.

ARROW SPORT: LeBlond 65; licensed, A-1 condition. Speed ring, navigation lights compass, metal prop. Less than 100 hours since new. \$650 cash. F. C. Richards, Fox Theatre, St. Louis, Missouri.

TRAVEL AIR: OX-5, \$385. Licensed, in perfect condition American Eaglet, \$550. Loening Commuter, \$2,850. Inspection by appointment only. Pioneer Aviation Co., Airport, Syracuse, N. Y.

WACO: 125 Siemens; spar broken, lower left wing and needs right side landing gear and minor repairs. Cheap for cash; trade, buy or sell parts. M. Mathewson, Box 134, Henderson, Texas.

FOR SALE: Two practically new Curtiss-Junior monoplane with 25 and 91 hours. Cash prices, \$600 and \$550, respectively. Eckel's Air Service, Inc. Washington, New Jersey.

FOR SALE: Fledgling, Monocoupe, Fleet, Stinson, American Eaglet, many others. Terms to responsible parties. Write or wire Aircraft Brokerage and Finance Co., 6115 North Clark Street, Chicago, Illinois.

J-6-5: Just overhauled. Will sell for \$600 or will exchange for Taylor Cub, Gipsy Moth or what have you? AERO DIGEST, Box 1612.

WACO TEN: OXX-6; two Scintilla magnetos, Miller overhead, Goodyear Airwheels, and Thompson valves; perfect condition. Licensed June 1934. Price \$500. J. Warren 316 Rutland Road, Brooklyn, N. Y., or Hangar 6, Floyd Bennett Field.

TRAVEL AIR E-4000: J6-5; new cover, finished in cream and vermilion. Lights, brakes, new air-starter, plenty of instruments. Crack-up accepted in trade. Boyers Airport, Melbourne, Kentucky.

FOUR-PLACE BIRD: 125 h.p. Beautiful condition with starter, metal propeller, arol struts, airwheels and brakes. Color red and silver. \$1,850. Sundorph, Cleveland Airport, Cleveland, Ohio.

RYAN J-5, Eaglerock J-6-165, Waco 125 Siemens. All licensed and in good condition. Make me an offer; will take Lambert or Warner Monocoupe in trade. M. Mathewson, Henderson Airport, Henderson, Texas.

FOR SALE: Crashed Waco Warner F; repairable; complete less engine. Sold as is; first \$450 takes it. \$75 deposit necessary. Wings Corporation of Philadelphia, Wings Field, Blue Bell, Pennsylvania.

WARNER-FLEET: 650 hours; excellent condition; always privately owned by present owner. Price \$1,200 cash. NC licensed until December, 1933. AERO DIGEST, Box 1601.

WACO F-2: 210 h.p. Continental motor. Flown only 33 hours; \$2400. Many extras: Heywood starter, steel propeller, speed ring, Pioneer bank and turn indicator, Pioneer rate of climb indicator, two altimeters, balloon tires, brakes. Act quickly. Prohinsie, 209-30 Northern Boulevard, Bayside, L. I., N. Y. Telephone: Bayside 9-7600.

FOR SALE: Curtiss Wright Jr., perfect condition, licensed to April 1934. Ely Ellison, Cleveland Institute of Aviation, Cleveland Airport, Cleveland, Ohio.

FOR SALE: OX-5 Waco in excellent condition, \$650. J6-5 American Eagle being rebuilt. Also good used J6 parts. R. Kerr, Hebron Airport, Hebron, Maryland.

VELIE late type engine and propeller. Total time, 275 hours; just major overhauled; excellent condition; \$125. Don Flower, Troy, Ohio.

NEW STANDARD D25, \$2,200. Ryan B-5, \$2,500. Both planes and engines just rebuilt and in new condition. Unusually attractive colors. Standard Air Service, Inc., Teterboro Airport, Hahrbrook Heights, New Jersey.

FOR SALE: American Eagle Model A1, damaged by crash and fire; also some spare parts; \$100 complete. Glen Niederhauser, Marshalltown, Iowa.

FOR SALE OR TRADE: Stinson Lycoming Model SM8A. Licensed until May 1934; 575 hours including one major overhaul; \$1,650 cash or will accept two- or three-place ship in trade. Glen Niederhauser, Marshalltown, Iowa.

WASP STINSON: Perfect condition. Overhaul by American Airways. Licenseable for eight. Best buy in Northwest. Wire, write W. Cameron, Pettibone, LaCrosse, Wisconsin.

Used Planes and Engines

LOCKHEED AIR EXPRESS: Wasp C. motor, 375 hours, never cracked up; at quick sale price. Will accept good used Stinson as part payment or trade for latest model. E. Smith, Teterboro Airport, Hasbrouck Heights, N. J. Hasbrouck Heights 8-0202.

WARNER STINSON: 4-place. Perfect condition. Blind flying instruments. Metal propeller. Motor recently had major overhaul. A good buy at \$1,100. Sundorh, Cleveland Airport, Cleveland, O.

FOR SALE: J-5 Travel Air; 5 hours since top overhaul. Instruments in both cockpits; 375 hours total time. \$1,200 cash. V. C. Tisdal, Jr., Elk City, Oklahoma.

DH MOTH: Unusually good condition; private owner; wing slots, air wheels, Pioneer bank and turn and rate of climb; a sacrifice at \$375. Irvin 24-foot white silk parachute; recently repacked; 275. Address P. O. Box 308, Columbia, Missouri.

STINSON JR.: Total time 300 hours; equipped with Radio receiver; flares and Pyle landing lights; turn and bank climb indicators; two new Exide batteries; motor just completely overhauled and modernized by Lycoming Co. Licensed to June 1934. Excellent ship for blind and night flying. \$2,000. Located near New York. AERO DIGEST, Box 1615.

CURTISS JUNIOR: Just recovered; ship completely overhauled, attractive paint job; bargain at \$550. Another Junior, practically new condition, sales demonstrator, \$500. North Shore Airways, Curtiss-Wright Airport, Glenview, Illinois.

WACO TEN: Licensed to July '34. For sale, first offer, or trade for air-cooled ship. Consider ship needing repairs or minor crackup. Ship located in Oklahoma. AERO DIGEST, Box 1616.

FOR SALE: \$1,200 cash for licensed Warner Fleet, Model 1. New steel prop, air wheels and brakes. Ship just completely recovered with special finish. New type motor. 230 hours, no time since complete top overhaul. Courtney MacConnell, Box 44, Davidson, North Carolina.

SWALLOW TP: Dismantled; will assemble, without motor. Also, Great Lakes right lower wing, wing strut, gas tank and airwheel hubs, size 22 x 10.4. Will accept reasonable offer. Charles Acosta, 433-14th Street, Brooklyn, New York.

MONOCOUE: Lambert 90, late model. Hamilton metal propeller. Perfect condition throughout. Compass. Hassenger Bros., 528-29 Davidson Bldg., Sioux City, Iowa.

FLEET: Kinner B-5; exhaust collector ring, steel prop, air wheels, \$1,500. Waco Siemens, ship and engine completely overhauled, recovered. Speed ring, air wheels, steel prop and brakes. \$1,050. Air Activities Airport, West Chicago, Illinois.

WARNER MONOCOUE: Fastest standard Monocoupe in U. S. Cruises 125-130 m.p.h. Finished yellow, scarlet. 225 hours total. Guaranteed excellent condition; cheap. Eau Claire Airways, Inc., Eau Claire, Wisconsin.

AMPHIBION: Savoia Marchetti three-place, always hangared at factory; licensed to August 15, 1934. 90 Kinner, all instruments, air starter, duals; about 60 hours; \$2,000. No trades. Harry Freedman, 270 Madison Avenue, New York, N. Y.

GOLDEN EAGLE CHIEF: LeBlond 90, 2-place open monoplane. Licensed to July 1934. Excellent condition. 275 hours. \$750 cash. W. R. Reese, 222 Piedmont Bldg., Greensboro, North Carolina.

FOR SALE: Travel Air 6000-B six place cabin. Flares, landing lights, bank and turn, speed ring. Wright J6-300, excellent condition, \$1,200. Savoia-Marchetti 3-place amphibion, Heywood starter, just recently and repainted. Excellent condition throughout. \$795 for quick sale. Trades accepted on either ship. O. H. Babcock, Jr., Bettis Airport, Dravosburg, Pennsylvania.

FOR SALE: Slightly damaged Lycoming Stinson, model SMSA. Must sacrifice at once for \$250. Inquire J. M. Weisberg, 424 E. Jefferson St., Syracuse, New York.

WARNER ARISTOCRAT: Three-place cabin monoplane, 40 hours since major overhaul, fuselage recovered and ship refinished. Bargain for quick sale. W. P. Corrington, 1220 West 9th St., Cleveland, Ohio.

CASH OR WILL TRADE: Travel Air 2000 in good condition for Waco F, Monocoupe, Bird, Great Lakes, or similar airplane slightly cracked or needing recovering. Ozark Airways, Inc., Municipal Airport, Springfield, Missouri.

LICENSED seven-cylinder Warner Command-Aire, excellent condition. Hamilton Standard steel propeller, all instruments. Always kept in hangar. Air wheels. \$900. R. A. Shelor, Sumter, South Carolina.

FOR SALE: Aeronca, Kinner Bird, OX Bird, Fleet, Great Lakes, Lockheeds, New Standard Trainer, Sikorsky S-38, Stinson, Jr., Challenger Travel Air, J-6 Ryan, J6-300 Laird, Bellanca, Loening Commuter. Aircraft Sales Co., Hangar D, Roosevelt Field, Mineola, N. Y.

STINSON, JR., Model S, 140 hours. Leather upholstery. Wheel fenders. Must be seen to be appreciated. \$2,250. One Curtiss Junior, licensed, less than 200 hours, \$375. One three-place Spartan, licensed, \$650. OX-5 Challenger, excellent condition, Scintilla magneto, less than 300 hours, \$600. Kinner Fleet, licensed, \$900. Aeromarine Klemm, Salmson, licensed, \$325. Flying Dutchman Air Service, Somerton Airport, Philadelphia, Penna. Warner 0666.

WARNER FLEET: Excellent condition. New linen. Equipped with blind flying instruments. Motor recently had major overhaul. Metal propeller, air wheels. \$1,600. Patrick, Cleveland Airport, Cleveland, Ohio.

THREE NEW STANDARDS: D-25's; J-5. Licensed; in good condition; \$1,400; \$1,600; \$2,800. J. J. Farone, Saratoga Springs, New York.

FOR SALE: J-5 Stearman, just recovered, \$1,450. Sikorsky S-38, Lockheed Vega, Lockheed Sirius, Warner Travel Air Sportster, Warner Aristocrat, 4-place Bird. Aero Brokerage Service of N. Y., Roosevelt Field, Garden City, N. Y.

CURTISS JUNIOR: Overhauled, perfect condition, all improvements; OX-5 American Eagle, good condition, never damaged, \$350. Terms, trades, delivery. Propellers, starters. Eagle parts. AERO DIGEST, Box 1617.

FOR SALE: Curtiss-Wright Jr. with 45 b.p. Szekely engine. Ship just relicensed; fuselage repainted red with silver wings. Total time, 290 hours. Price, \$425. Andy Stinis, Floyd Bennett Field, Brooklyn, N. Y. Midwood 8-9192.

WACO F: 50 hours total time; perfect condition; 125 b.p. Kinner motor. Exceptional Bargain. May trade Waco F-2. Lyons Battery and Electric Co., Altoona, Pennsylvania.

OX-5 MOTORS: Just purchased from the Government. Guaranteed brand new and complete. Shipped privilege inspection. Reasonable price. Grant Marine Motor Co., 827 Whittier, Detroit, Michigan.

WACO NINE: OXX-6. Beautiful condition. Never cracked. Dismantled. Bargain at \$250. E. E. Lawrence, 29 1/2 Chestnut St., Newark, N. J.

TRAVEL AIR BIPLANE: OX-5 motor. Licensed; excellent condition. Semi-air wheels, dual controls, compass. Will fly anywhere for expenses. A bargain at \$650. Maume Co. Co., Fort Wayne, Indiana.

WACO QCF: Continental 165. Instruments front and rear cockpits. Plane in beautiful condition. Bargain at \$2,600. Can be seen at Curtiss-Wright, Hadley Field, New Brunswick, New Jersey.

BULL PUP: 80 hours; \$465. Irving chute, 655. Hunt Crusader safety plane. Loening amphibion. Wasp B and LeBlond engines. Walton Airplane Co., Box 1457, Tampa, Florida.

FOKKER SUPER-UNIVERSAL: Wasp. Ship completely rebuilt and relicensed April 1934. Total, 600; 150 since motor majored. Asking \$2,500; will consider reasonable offer. Accept Stinson Lycoming in trade. J. Gore, 1033 Ocean Avenue, Brooklyn, New York.

WACO F-2: 165 Continental, complete set of instruments, wing-root fairing, radio shielded. Total time, 210 hours; 10 hours since major overhaul at Continental factory. Privately flown, like new ship. Price, \$2,850. Silk seatpack chute, never jumped. Like new, to purchaser. Laura A. Schmidt, 630 East Town Street, Columbus, Ohio.

ALEXANDER FLYABOUT: cabin monoplane, licensed, \$590. Ideal for winter flying. Cabin heater. Very economical. New type Szekely motor. Plane and motor less than 90 hours total time, and in excellent condition. Reason for selling, quitting flying. S. H. MacPeak, Mason City, Iowa.

WASP C: Almost new. Wright J6-9E, Continental A-70, Wright J6-5. Parts for all engines. Aero Salvage Co., Glenn Curtiss Airport, Jackson Heights, New York.

WACO TEN: New condition, just relicensed; \$350. Command-Aire OX-5, splendid condition, \$325. The Little-Greiner Flying Service, Municipal Airport, Springfield, Ohio.

HORNET-POWERED Loening Airyacht, completely overhauled. Challenger-powered Fledgling. Wright-powered Travel Air 6000. Wright-powered Loening Commuter. O. J. Whitney, Inc., Glenn Curtiss Airport, North Beach, New York.

OX-5 WACO 10: \$185, cash. Identified, flies well, airworthy, must be recovered before licensed; Supreme propeller; 1350 on ground. No letters answered; come or wire Frank Knauf, Punksutawney-Bræebreeze Airport, Marchand, Pennsylvania.

Miscellaneous Services Opportunities, Offers, etc.

LOOK! OPPORTUNITY! For flying school, equipment service, transport operator, general contractor or manufacturer. Will lease, \$100 month, or sell, \$10,000, my new modern steel hangar and work shop, eighty by sixty, with modern new three-room office or apartment on one acre fenced and located on corner paved highway and Love Field Airport (one of only five airports with A-T-A rating). N. E. Bushy, Love Field Airport, Dallas, Texas.

JOIN TODAY! No dues, no fees. White men over 17, eligible. Write to National Headquarters, National Aeronautical Club, Inc. Organized 1925. Alton, Illinois.

STORAGE RATES: \$10 monthly. Steel hangar thirty minutes airline south New York. Thirty minutes north Philadelphia. Watchman always on duty. Central Jersey Airport, Windsor, New Jersey.

Parachutes For Sale

PARACHUTES: Approved type. Seat, back, lap and chest; bought and sold; exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Ill. Established, 1903.

FOR SALE: One Irvin parachute used only four times. Repacked by licensed rigger. Cash price, \$150. Eckel's Air Service, Washington, N. J.

Help Wanted

WANTED: Pilot with amphibion, preferably S-39. Good opportunity. Address AERO DIGEST, Box 1599.

WANTED: A transport pilot for part time work and office work if qualified. Write giving full details, date of birth, place of birth and hour if known, state whether married or single and previous business experience. Room 1702, 99 Wall St., New York, N. Y.

WANTED: Young man, part time. Must have sales experience, letter writing ability for subscription promotion for aeronautical publication. AERO DIGEST, Box 1613.

Miscellaneous Products & Equipment For Sale

FOR SALE: Two GE 24-inch beacon lights, 5 years old. One stationary and one revolving, two speeds. Has assembly for course lighting, and automatic lamp-changer. Stepdown transformer on revolving beacon. Also steel tower 30 feet high, with platform around lights. Total original cost, \$1,430. Will sacrifice. Old National Bank, Evansville, Indiana.

DON'T BUY anything until you get Ort's 1933 Aviation material Catalog. Prices are lower. Send one thin dime today. Karl Ort, 601 W. Poplar Street, York, Pennsylvania.

CHALLENGER CYLINDERS: Used, A-1 condition, complete with valves, rocker arms, rocker box covers, valves ground, ready to use; \$25. Other used parts. Jack Roth, Curtiss Field, East St. Louis, Illinois.

RADIO SHIELDED, 18 B G plugs, perfect condition. Will take best offer or trade for rate of climb or time recorder. AERO DIGEST, Box 1608.

PROPELLERS: Lowest prices in the country. Steel props for Warner, J-5 and J-6. Brand new late production Hamilton wood props for Warner, Kinner, Wright Whirlwind, Wright Gipsy, Hissco, Ryan-Siemens, Anzani, American and Hiaso Cirrus, Curtiss Challenger, \$20 each. Have almost every brand for any motor. Central Air Service, Battle Creek, Michigan.

DE HAVILLAND GIPSY engine, \$150. J6-5, overhauled, \$450. Kinner and J-5 parts 50% off list. Stinson Junior "S," \$2,250. Will buy Tank engine. AERO DIGEST, Box 1611.

FOR SALE: Complete aerial photographic outfit. Includes Fairchild K3 aerial camera, with extra filters, mount, magazine, carrying case, etc., and Fairchild FC-2, powered by Wright J-5. Airplane will be completely overhauled and finished in colors requested by purchaser. Engine 71 hours since overhaul. Total price, \$2500. Pittsburgh Aviation Industries Corporation, County Airport, Pittsburgh, Pennsylvania.

AERIAL CAMERA: Follmer Graflex K-10, complete with case; f4.5 anastigmatic lens, 10 inch focal length. Takes 5 x 7 pictures. Original cost, \$545. Excellent condition, used very little. Price \$100, cash only. A. R. Holladay, Air Service, Inc., New Castle, Delaware.

WORLD WAR RELIC: Just released from War Department. Marlin Aircraft Machine Guns; new, but rendered unserviceable by U. S. Government to comply with law. Fine for den or clubroom. Weight 25 pounds. Price \$7.50. Sent \$1 with order, balance C.O.D. by express. Fiala Outfits, 47 Warren Street, New York, N. Y.

HANGAR EQUIPMENT: Will consider partnership. Also J-5 motor, \$100. J-5 cylinder, \$15. LeBlond cylinder, \$10. Mark III cylinder head, \$3. Benjamin Zebora, 96 Albion Place, Port Richmond, New York.

TRAVEL AIR 2,000 PARTS: Tail assembly, wings, fuselage. Long nose OX-5 Eagle parts; Fuselage, two right wings, tail assembly. Szekeley and Lycoming engine parts at large discount. Ozark Airways, Inc., Municipal Airport, Springfield, Missouri.

FOR SALE, WINGS: Waco Ten, Travel Air, American Eagle, Eaglerock, Waco Cahin. Prices, \$30 and up. The New London Aircraft Co., New London, Ohio.

FOR SALE, WING PARTS: Ribs, spars, etc., for Waco Ten, Travel Air, American Eagle, Eaglerock, Waco Cahin. New London Aircraft Co., New London, Ohio.

STINSON JUNIOR SM8A landing gear complete. Right upper Fledgling wing. Right lower Fledgling wing. Three-blade Wasp propeller (tractor). O. J. Whitney, Inc., Glenn Curtiss Airport, North Beach, New York.

Wanted To Buy Or Trade

WANTED TO TRADE: For two-place ship, licensed. Brand new V-8 Ford coupe or 1929 Chrysler sedan. What have you? Paul Moeller, Kings Creek, South Carolina.

WANTED: Upper and lower wings, right side, for Parks P-1. Uncovered acceptable. Also Miller valve action and prop for OX-5. A. L. Sharp, Alpine, Texas.

WANTED: Used Aerona 113 or Continental A-40 motor. Must be in good condition and cheap for cash. Address P. O. Box 561, Montgomery, Ala.

WANTED: Used planes and engines up to 165 h.p. Also airwheels, shop equipment, etc. Give all details. Eastern location desired. AERO DIGEST, Box 1603.

WANTED: Two- or three-place air-cooled ship, in any condition. Will pay cash. Rising Sun Aircraft Schol, 857-857 E. Luzerne, Philadelphia, Pennsylvania.

WANTED: NACA cowling and wheel pants (32 x 6) for J-5 Lockheed. Also Hamilton Standard steel propeller for a J-5. Stanley G. Fuller, Milford, Iowa.

WANTED: Aerona E-107A engine. State condition, hours, date of manufacture, and cash price in first letter. Robert F. Stevenson, Monroe City, Missouri. R. F. D. No. 4.

WANTED: Lower left wing for Command-Aire 3C3 trainer. State lowest and cash price. S. Pittoni, 243-08 137th Avenue, Rosedale, L. I., New York.

WANTED: Buhl Bull Pup, licensed, low priced. Chevrolet late 1930 coupe, like new, 21,000 actual, as down payment. Balance by month. Responsible party. Edward H. Johnson, 64 Grand Street, Springfield, Massachusetts.

WANTED: J6-5 Travel Air. Warner Bird or similar ship. All details first letter. Garth Norman, 1001 Upper Cahokia Road, East St. Louis, Illinois.

Positions Wanted

YOUNG MAN, 20, high school graduate, desires position with individual or firm. Work for small salary and flying instruction. Mechanically inclined. Go anywhere. William J. Zakas, Box 482, Port Jefferson Sta., New York.

B. S. AERONAUTICAL ENGINEERING: Desires job in aeronautical industry. Willing to do anything for start. Go anywhere. Age 22, married. References. AERO DIGEST, Box 1575.

BOY unable to attend college wishes chance in aviation. Interested construction or repair but will take anything. Ambitious, hard working. Good references. Ralph Prince, Groton, Mass.

YOUNG MAN: 25 and single, wants to make aviation life work; has completed 12 weeks ground course, also 8 hours dual. Can go anywhere. References. Write Ted McKaig, General Delivery, Providence, Rhode Island.

AERONAUTICAL ENGINEER: Eight years' experience in successful airplane design. Has design for new and saleable airplane in high quality, medium priced, private owner field. Seeks contact with established manufacturer or responsible builder for its complete development. AERO DIGEST, Box 1607.

NAVY PILOT: Transport rating, experience land-planes, seaplanes, night and blind flying. Good mechanic, knowledge of radio. Single, age 25. Available December. AERO DIGEST, Box 1699.

SEASONED PILOT: Experienced airline, blind and beam, eligible S. A. T. R. Trained by authority. 1,500 hours, land, water. Navy trained, sea service. 300 night and bad weather flying. Age 30, officer U. S. N. R. Presentable, versatile. Licensed Transport, A. & E., Radio. As pilot for private owner, airline, mail or instruction. AERO DIGEST, Box 1610.

TRANSPORT PILOT: 833 hours Naval and commercial flying. Experienced land and seaplanes, single and multi-motors, night and instrument flying. References. AERO DIGEST, Box 1600.

EX-NAVY PILOT: 26, transport license, 4 years flying, 3 years experience upkeep and repair land and seaplanes. Honorable discharge and references. Fly or "mech" any place. AERO DIGEST, Box 1602.

YOUNG MAN: 20; desires position to gain experience on airplanes and engines. Willing to travel. Mechanically inclined; salary secondary; best references. John Felthous, Backus, Minnesota.

RESEARCH ENGINEER of recognized standing desires employment by manufacturer entering accessory field, or as executive engineer in established company. Fifteen years' experience in aeronautics, in engineering, sales and executive capacities. Licensed pilot. AERO DIGEST, Box 1614.

TRANSPORT PILOT: 300 hours; graduate Master Pilot Course, Boeing School of Aeronautics. 23 hours instrument flying; instruction experience; excellent references. Age 19. Minimum wage. Herbert R. Mandel, 60 East 96th St., New York, N. Y.

FOR EXPENSES: Transport pilot will fly for private owner or others. Good mechanic; open and closed ships. Single, 24. References. AERO DIGEST, Box 1618.

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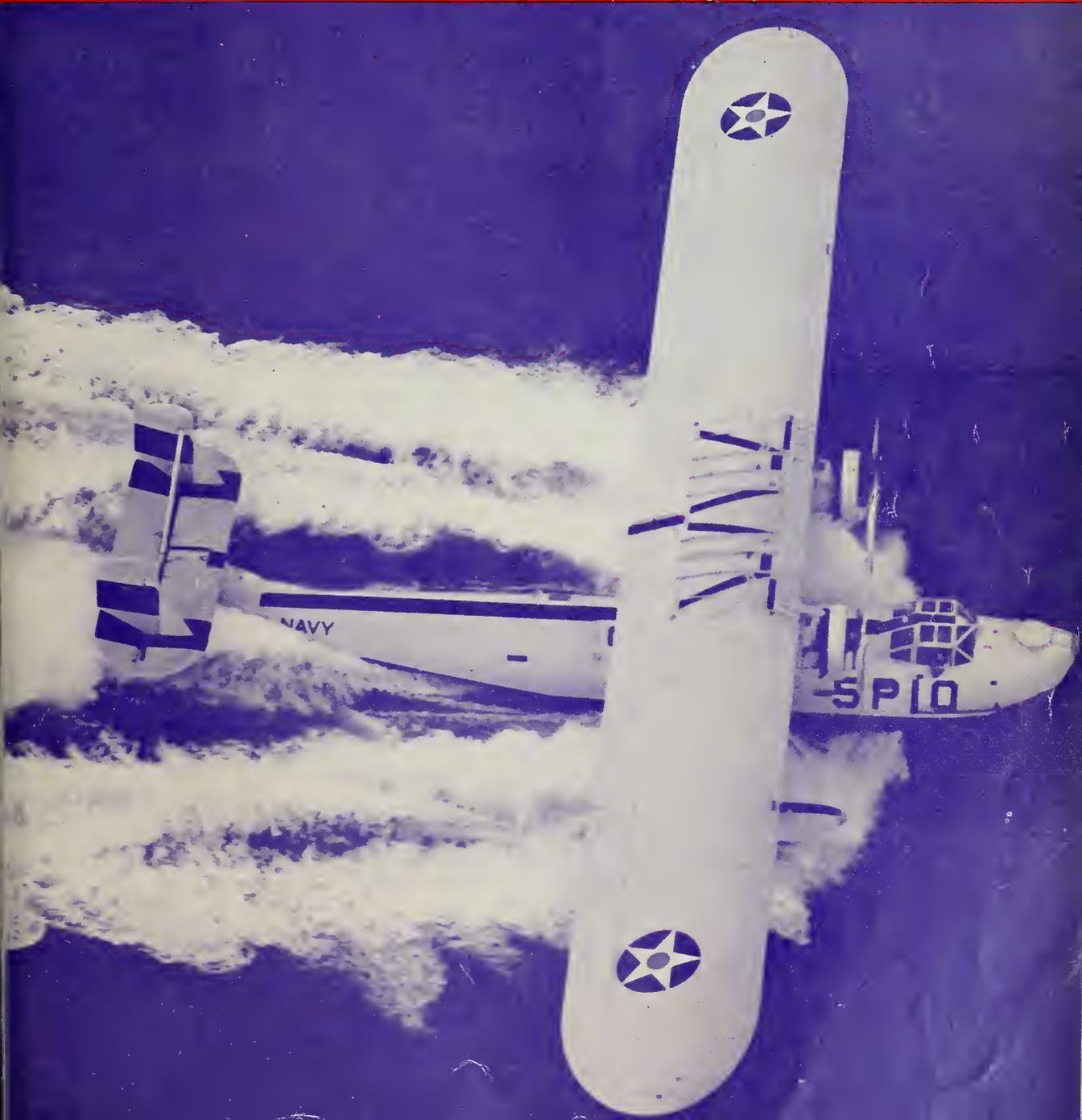
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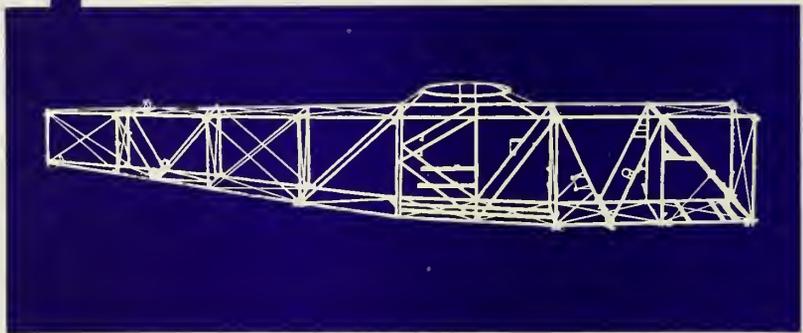


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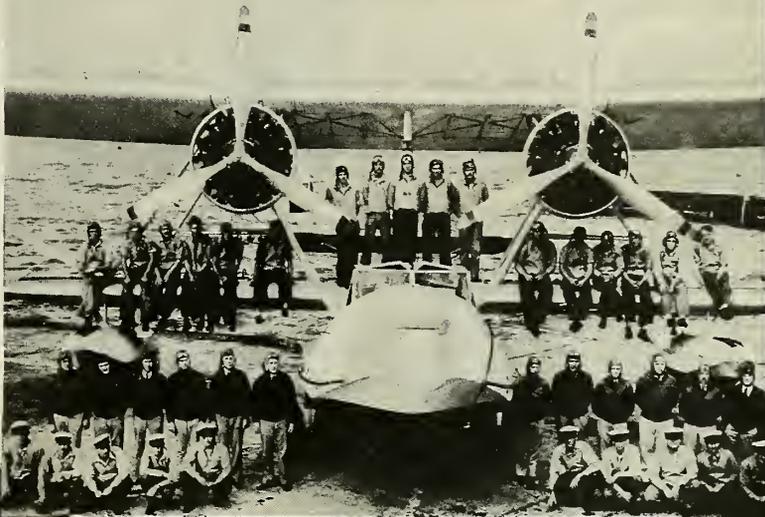
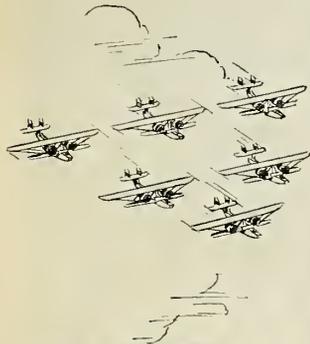
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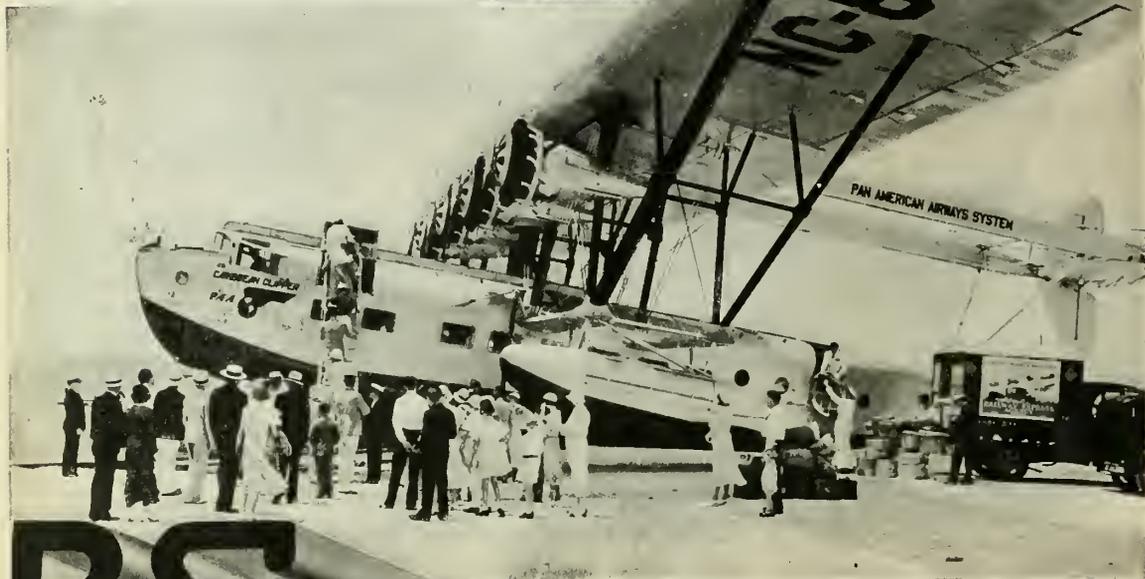
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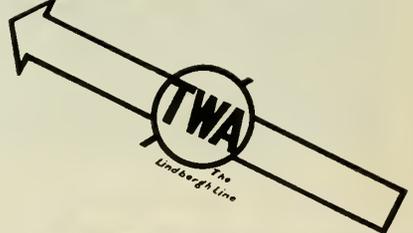
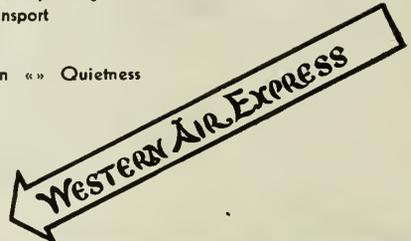
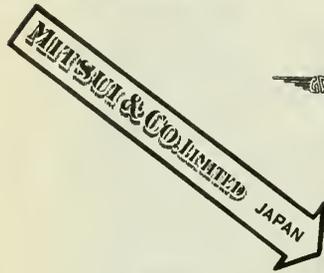
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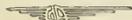


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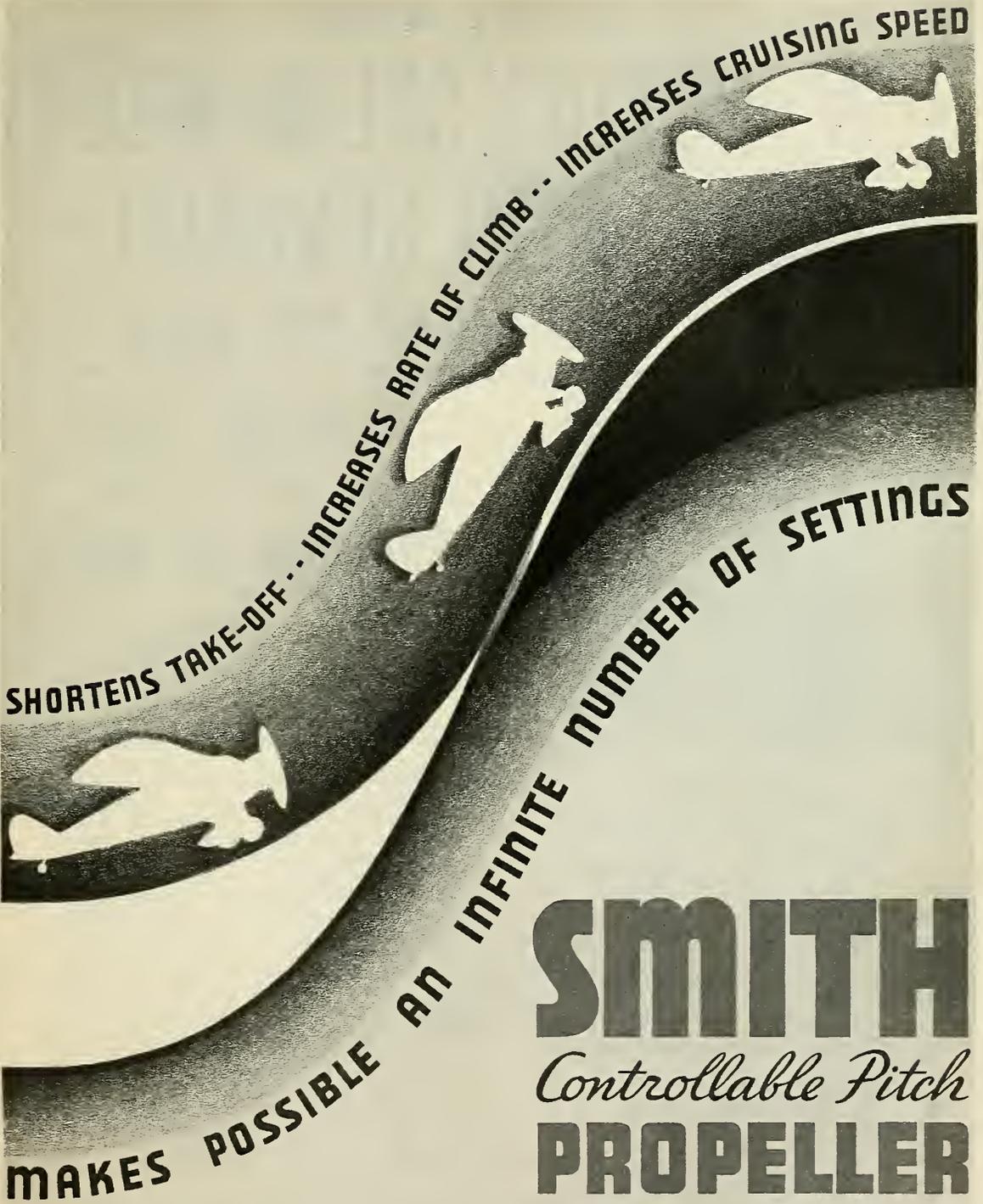
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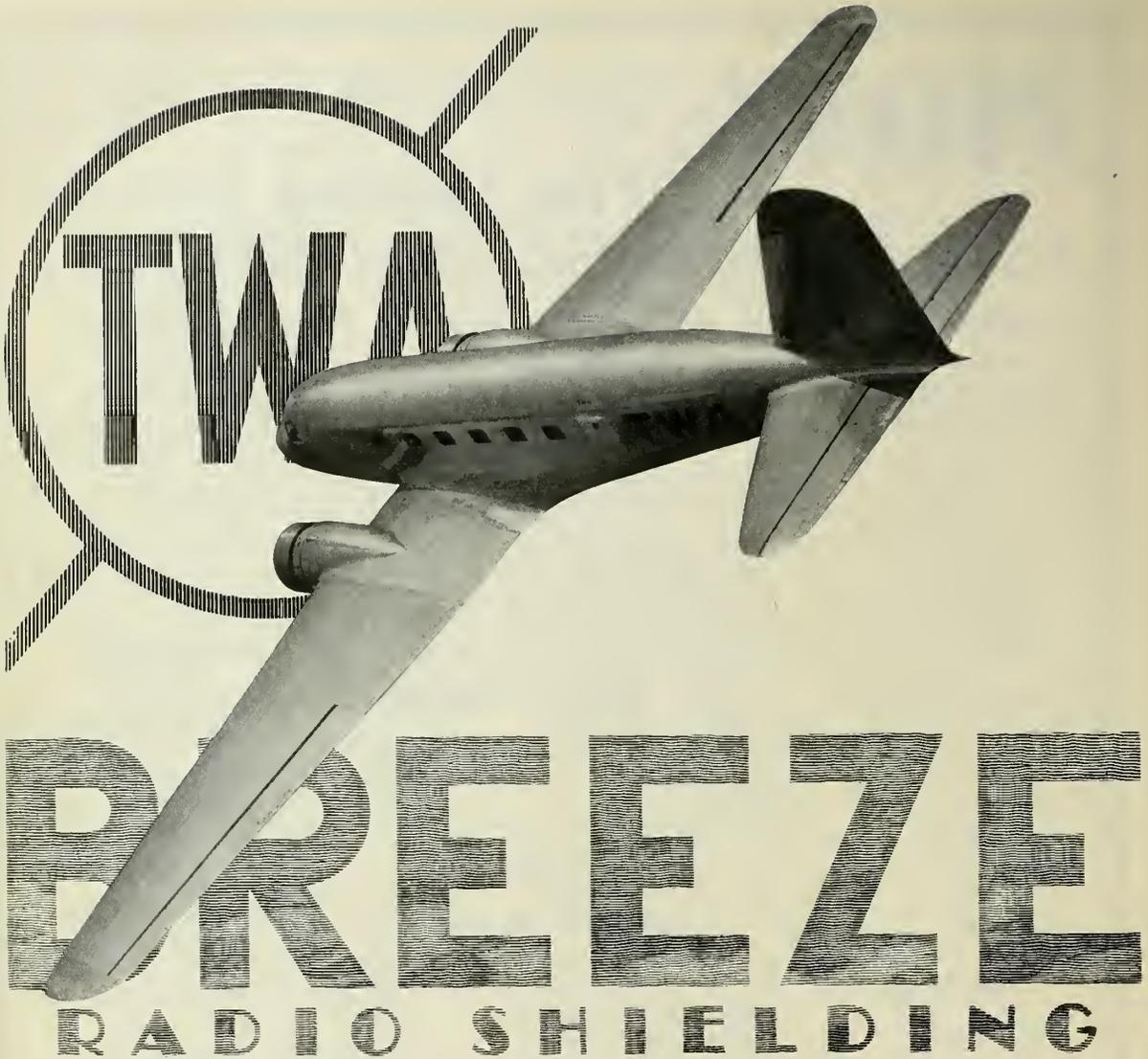
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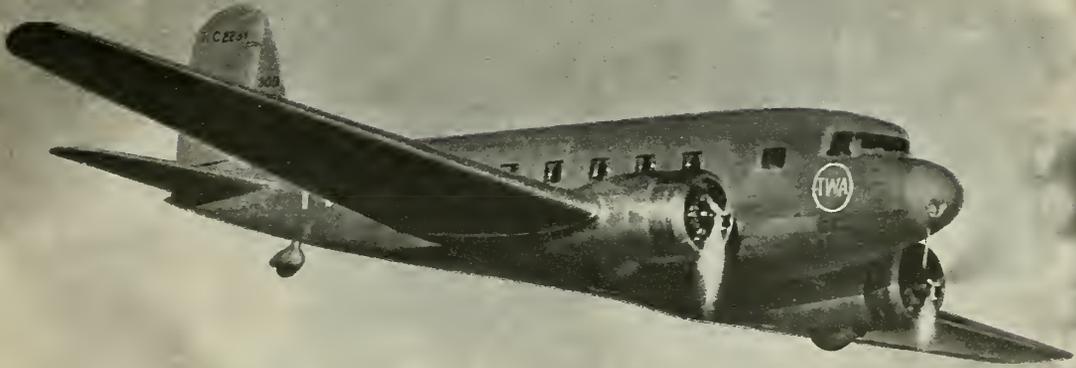
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COMMANDER FRANK M. HAWKS TELLS ABOUT HIS LATEST PLANE



THE TEXACO SKY CHIEF EMBODIES MANY NEW DEVELOPMENTS

The Texas Company has for many years been one of the outstanding leaders in furthering the practical development of the airplane and the application of safe speed in commercial air transport. This latter was one of the principal objectives in working out the details of the latest ship, the Texaco Sky Chief, which made the non-stop record of 13 hours and 27 minutes from coast to coast.

The Texaco Sky Chief embodies a number of new features which, though not radical, give a marked increase in the efficiency of the craft with respect to speed, weight and low landing speed.

The use of lighter alloys, light construction and a very large fillet provided strength as well as lighter weight. The Sky Chief carries a load greater than its own weight. The large fillet also adds considerable strength between wing stub and fuselage and greatly increased speed.

Landing speed reduced

Split trailing-edge flaps covering about 20% of the bottom chord of the wing have made it possible to reduce the landing speed to 40 m.p.h. with a light load and not over 55 m.p.h. with the full gross load of 7,500 lbs. They have reduced the take-off run approximately 30% when extended downward between 15 and 20 degrees.

New engine features

A special development of the 14-cylinder, double-row geared motor made it possible to add considerably to the plane's speed. The overall diameter of the fuselage is held down to 45 inches—the diameter of the motor. This thin fuselage, with the rather large wing surfaces, of about 263 sq. ft. and the use of controllable-pitch propeller and proper super-charging, gave very greatly increased power possibilities at higher altitudes.

Top speed at 7,000 ft. with the motor developing 730 h. p. is, at present, 248

m.p.h. The cruising radius at 85% power, operating at 220 m.p.h. is 2,500 miles. The plane can fly as slowly as 70 miles per hr.

Special robot pilot

A robot pilot of unusual, though simple, design has been very satisfactory. It weighs but 25 lbs. A compound pendulum and compass, actuating through low pressure vacuum, controls the Sky Chief on all its axes. On the 2,240-mile coast-to-coast flight, this highly successful little robot helper had full charge of the plane for over 1,500 miles.

Unusual radio equipment

The radio equipment is especially noteworthy. The receiver is a four-tube "super-het" with switch arrangements to permit reception of code signals as well as voice. It is extremely sensitive and uses a very small amount of power. Suitable radio direction finders will shortly be installed for accurate radio navigation in any part of the world. Two of the tubes are hooked up for double duty; giving the power and sensitivity of a 6-tube set, with only four tubes actually employed. The complete installation, including battery, weighs only 7 lbs.

The transmitter utilizes a trailing antenna of quarter wave length, tuned by its actual length for each frequency employed. Power is secured from the ship's 12-volt battery, through a motor-driven Eclipse generator. It is an interesting fact that with quite a limited amount of power, the station being only a 50-watt transmitter, there is actually some 45 to 48 watts emitted from the antenna itself, which is a very high degree of efficiency. The power arrangement of the radio hook-up also permits very favorable operation on the ground with the antenna run out to any nearby tree or pole. A pilot on a forced landing could transmit signals for a period of approximately four hours before the battery would become affected.



The instrument board

The board is exceptionally well laid out for ease in operation, especially when flying blind. The compass is mounted directly in line with the pilot's eyes. The complete night flying installation includes an interesting landing light fitted into the leading edge of the wing and conforming to the contour. In the event of a forced landing there are five one-minute flares mounted on the head rest and operated electrically.

Texaco Aviation Gasoline Texaco Airplane Oil

Nothing but Texaco Aviation Gasoline has been used in the new ship because it has been found to give exceptionally uniform and satisfying performance. Texaco Airplane Oil is the only oil that has been circulated through the motor. It is interesting to note that there has been no appreciable wear whatsoever. This fine performance gives testimony to the excellent qualities of Texaco Aviation Gasoline and Texaco Airplane Oils in air service.

THE TEXAS COMPANY, 135 East 42nd Street, New York City

TEXACO



AERO DIGEST

VOLUME TWENTY-THREE

NUMBER FOUR

CONTENTS FOR OCTOBER

COVER DESIGN

One of the six Wright Cyclone-powered Navy-Consolidated P2Y-1 flying boats which flew in formation non-stop from Virginia to the Canal Zone, 2,059 statute miles, in 25½ hours.



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Sidney Bonnick Photo

The influence of military design on modern commercial aircraft

A Consolidated "Commodore" flying boat of the Pan-American Airways System similar to the Navy's Consolidated P2Y-1 on the front cover of this issue

AIR

hot and otherwise

FRANK A. TICHENOR

• There is a tide in the affairs of men which taken at its flood . . . a poet said that—a pretty good poet, who was seeking to get across the idea that there was a time for success, and a time for failure.

We are prayerfully hopeful that October 20-21, this year of 1933—*Please note the date*—may prove to be the period of the flood tide which has been running for some time counter to all of the questionable practices and selfish interests of the Bingham bloc in the National Aeronautic Association of the U. S. A. We are confident that this tide, if taken at its flood, will lead on to a never before dreamed of success for those who for a long time have cherished the quaint idea (to Bingham) that the National Aeronautic Association should be an organization working in the service of aeronautics, promoting the best interests of the new science in the non-commercial fields, and assisting to enlist the aid of the American people to aeronautics and to focus their interest in its behalf. We are also hopeful when that tide, in the natural course of events, begins to recede it will carry out to well-earned oblivion all of those who have consistently and efficiently worked to defeat the original aims and objectives of the N. A. A.

It has been inspiring to note the growth in recent months, in different chapters of the organization throughout the country, of a concrete realization that the time for a change and a complete house cleaning has come. (*The date is October 20-21.*) It was perhaps inevitable that each of these individual chapter movements for a change should contain the name or names of candidates for the position of the one who is to be deposed. The fact that such specific recommendations have been made indicates the seriousness for the desire for change and the completeness of the wish for that happy objective.

There is a danger in this situation. The bringing together of these individual chapter ballots may well result, in the last minute, in disastrous non-agreement among those most strongly committed to a belief in the need for a change.

AERO DIGEST has been pleased to note the chapter activities in recent weeks to organize against the customary steam roller tactics which in the past has always maintained the *status quo*. The submission of these plans has, in several instances, carried the request for our editor-

ial endorsement of some particular new slate. In all instances we have declined our endorsement. We refused for the simple reason that we did not wish to damn any proposed candidate with the faint praise that "anyone would be better than what we've got." And yet excellent as many of the proposed candidates are, the real seriousness of the situation is still best contained in die-hard adherence to the conviction that anyone will serve better than the incumbent. For the sake of ultimate success, we strongly urge open-minded adherence to that slogan until the last ballot is cast. It is through such preconvention harmony and solidarity that the greatest chance of success lies.

In lieu of a premature discussion of candidates and candidate qualifications, we urge first, unanimity among the majority that the time has come for change; and agreement upon a policy which will assure the N. A. A. of a New Deal. It must be realized, first, that the N. A. A. has been suffering for a long time from an inward growth of selfishness. It's a long time—and it seems even longer than that—since the N. A. A. ceased to serve the cause of aviation, and made aviation serve the cause and interest of those in control of the N. A. A. *The time for change* is the time for a change of this viewpoint.

The American people have demonstrated again and again their interest in aeronautics. Such interest of necessity is not a continuous flow; it comes periodically, in waves. It has been coming in such a manner since the end of the 1920's. A primary purpose of such an organization as the N. A. A. might be said to be that of capturing and solidifying these waves of interest so that it would be continuously at the service of flying in America. That would have meant an enormous enrolled membership in the N. A. A. But apparently (and for obvious reasons) the Bingham bloc were not interested in rendering that kind of support to aviation.

Time to Change

It was inevitable that membership should drop and well nigh vanish completely as those in charge became more and more involved in their own brand of organization politics. The organization as it disintegrated under the masterful "leadership" of Bingham held less and less appeal to a strictly amateur membership, who had nothing to contribute to American aeronautics except a rabid enthusiasm for clean and superior flying and their support for the fulfillment of America's rightful place in the air. And we do not believe that it can be denied with honesty that America has suffered through failure to maintain a medium through which this natural enthusiasm of the American people could express itself.

American aeronautics from time to time, particularly in recent years, could have used such support to good advantage. The time for change must be recognized as a time for the return to the first principles of the N. A. A. The time has come for N. A. A. membership to mean something in the mass, and not merely a professional vote to be garnered by the commercially wily for use behind the locked doors of a contest committee.

AERO DIGEST is confident that if this broader viewpoint obtains there need be no serious difficulties concerning who should be the next head of N. A. A.—that it becomes in reality a minor question in the face of the danger of a continuance of the old, disastrous policy.

We do not envy Bingham's successor. The mess and the wreckage behind the granite exterior of N. A. A., which must be cleaned up, would discourage a second Hercules.

Whoever may be called forth from the ranks of aviation enthusiasts to undertake this job need not, however, be unduly discouraged by the size of the task confronting him. It must always be borne in mind that as the elected leaders of N. A. A. turned the organization more and more to their own interests and purposes, they automatically divorced an ever-increasing amount of support and co-operation from the membership. With a new deal for the N. A. A., this support will return. All interest in the job which should be done by N. A. A. is not dead. A new deal will revive it. The needed support of the membership will be that much greater, coming as it will from the inspiration of a complete change.

THE AIR RACES--

as seen from a haymow

●

CY CALDWELL

• Seated in what I laughingly refer to as my study, I'm trying to recall some of the riot and rapture that I enjoyed during the International Air Races at Chicago, when the Brothers Henderson trod the sward with all the hopefulness of early Spring robins seeking worms—and finding none, as it turned out, for the meet was as financially sorrowful as a meet could be. But that wasn't their fault, any more than it was Major Shorty Schroeder's fault that his earlier Chicago meet had been a financial earache. The trouble lies with that architectural nightmare known as the Century of Progress: it drew people to Chicago, true. But it drew them to the Century of Progress and held them there; they didn't patronize any other show. Even the ball games played to small gates; and Ringling Brothers & Barnum & Bailey's circus fought vainly for patronage, then folded its tents like an Arab and silently stole away. The moral of this is plain: air races or other events scheduled as side-shows to some main attraction are foredoomed to financial failure. But who could know that in advance? The Hendersons, as is their invariable custom, put on a swell show, arranged adequate publicity, and if the public failed to turn out, that is not their fault.

Carping critics, if such there be, are reminded that the Hendersons remain the only ones in aviation who have collected over half a million dollars in cash prize money and turned it over to racing pilots. The total now is \$538,000 that they have paid in all meets; and no other promoters, so far as I know, can come within miles of that record.

The Journey Begins

I arrived in Chicago Sunday morning, and learned from six different taxi drivers that the fare was anywhere from \$7 to \$14 to get to that part of the Illinois wilderness where the races were being held—between 20 and 50 miles from Chicago, according to the driver interviewed. At the C. M. & St. P. station I learned that an expedition was being fitted out to take off for Curtiss-Reynolds field at 11:15. I got a return trip excursion ticket for 60 cents, a reasonable charge

when you consider the hardship of an expedition into the wilds. The engineer's wife was down to see him off, and the conductor's family was there, waving flags and wishing him a safe voyage.

With the station attendants waving farewell and the relatives of the train crew in tears, we pulled out for our unknown destination. Even Russell Owen, who had dared all at the South Pole with Byrd, hadn't come with us; it was too much for him. We steamed for miles and miles; warehouses gave place to scattered dwellings, farms gave way to great open spaces. Somewhere this side of Winnipeg, Manitoba, we stopped, evidently having run out of coal. And by the mercy of Providence, Rhode Island, it turned out that we had grounded within a mile or two of the airport. So we all took to the boats, snatching what provisions we could hastily salvage, and rowed to shore. Some donned life-preservers and swam through the surf of hot-dog and soft drink vendors, and after a struggle were washed up to the very gates of the airport where lines were thrown to us and we were hauled in out of the dust of the road.

As I read this over, it doesn't quite fit with the facts, but it gives the essential spirit of the adventure, which tried the stoutest souls, ruined thousands of pairs of feet, and stressed again the fact that what Chicago needs, in addition to an honest city government, is an airport on the lake front. Curtiss-Reynolds has an ideal race course, but is too hard to get to; the Municipal Airport is easy to get to, but has a fairly dangerous race course. The thing to do is to use the land now occupied by the Century of Progress as an Air Terminal; this will make Chicago the possessor of the world's most accessible Air Terminal, and that will be real Progress.

Getting there on Sunday, I missed the take-off of the Gordon Bennett Balloon Race. I've always felt that watching balloons take off was as interesting as standing in the Bronx Zoo waiting for the hippopotamus to come up in his tank, and looked about the same. I miss these static events when I can, for only balloonatics can get a thrill out of them. All the entrants are NRA—Non-Return-

ing Aeronauts. The moment they're gone, they're forgotten. Once they take off, every one seems to join in a tacit agreement not to mention them. They took off Friday and by Sunday were forgotten by all except the newspapers. They were; and then they were not—that's about the size of it. Days later I read about balloonists landing in the wilds, cutting down telephone poles, getting ptomaine poisoning from cans of beans. It probably is painful, but it isn't exciting. What excited my grandfather merely causes me to yawn.

The moment I arrived at the races I was captured by my friend, Hugh Sexton of the Chicago Daily Tribune, an old scrivener whose painful duty it is to watch all air events and then write entertainingly about them.

"Listen," he said, "do you want to enjoy these races? Do you, for once in your wretched, miserable life want to get out of the heat and dust, far away from a microphone and Hiram Bingham's speeches?" "Yes," I moaned, "I do." "Then," said he, "come with me to the Ladder Club, where you will be allowed to watch every event undisturbed, where you will see everything and be yourself unseen, where the autograph hunter ceases from troubling and old pilots may be at rest.

To the Ladder Club

How could I resist such a plea? I heaved my ancient carcass aboard his car and drove to the Ladder Club at the far end of the field. It was, I discovered, the hang-out of a group of ancient and very secret birdmen, of whom I chance to be a member. I climbed up a ladder to the haymow of an old barn on what once had been a farm, before Curtiss-Reynolds had arrived to desecrate the name of agriculture.

High up in the haymow of the old barn, the side of which facing the flying field had been torn out by loving hands, were seats and couches fitting for the repose of ancient limbs, a legal bar with beer, spigots and mugs, suitable for the solace of the feeble, and on it sandwiches, bread, bologna, ham, and other choice meats pleasing to the gods. Watching air races is dry work, as Ray Brown will testify, and if noble-minded brewers can be found willing to advance aviation, why should I not co-operate with them?

And thus, like the elfin sprite I am at heart, I saw the air races, undisturbed by dust in the throat, raucous brass bands, more raucous announcers, and dreary old men prating over the loud-speaker system about the N. A. A. For once in a long and largely misspent life I enjoyed myself thoroughly. Between quartette numbers, with Casey Jones at the piano, and Jimmy Doolittle singing what he thinks is tenor, I saw James R.

Wedell break the world's landplane speed record at an average speed of 305.33 m.p.h. It was all very well, but what thrilled me was our quartette's rendering of "My Gal Sal," and I want to tell you that if you want to hear "My Gal Sal" properly rendered you have to visit the Ladder Club. When we got through with Sal, she was no more than a sad memory. And as for the girl who married dear old dad, she couldn't have sounded that bad or dad would have moved on. Thus the races whizzed past, accompanied by music, or what we thought was music at the time. Roy Minor hurled

Ben Howard's Menasco-powered racer around the course at 195.40 m.p.h., and Art Chester flew the Chester Special at 187.26, while Gordon Israel wasn't far behind in the Israel racer, with 182.89 m.p.h. These speeds almost equalled that of Casey Jones on the treble part of the keyboard, but was somewhat below that of an earnest lad who shuttled back and forth bearing foam-covered steins, all perfectly legal.

On Monday I deserted the Consumers' Board long enough to announce one race, the 550 cu. in. free-for-all, in which the leading three were Roy Minor, Gordon

Israel, and Art Chester, with speeds of 201.80, 197.73, and 197.25, respectively. Now, all of these were good races, as air races go to-day. But unfortunately, as only one of each type of special racer was entered, the first or second lap gave each ship its place, according to its speed; and in that place it stuck, getting a little further ahead or a little further behind. The race became a fast procession with each ship as firmly stuck in its position as an Elk in a parade. After all, there's very little excitement in watching the leading ship maintain its lead, with no

(Continued on page 62)

RESULTS OF THE CHICAGO AIR RACES

Pilot and Home Field	Plane	Engine	Cu. In. Displ.	Speed (m.p.h.)	Money	Pilot and Home Field	Plane	Engine	Cu. In. Displ.	Speed (m.p.h.)	Money
Event 2. 375 Cu. In. Displacement						Event 12. Women's International Free-For-All					
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	163.77	\$360	May Haizlip, Ferguson, Mo...	Wedell-Wms.	Wasp, Jr.	985	191.11	\$1,125
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	162.20	200	F. Klingensmith, Minneapolis	Gee Bee	Wright J-6	972	189.04	625
G. Hague, Los Angeles, Cal...	K.-Ryder R1	Menasco	363	160.35	120	Martie Bowman, Burbank, Cal.	Gee Bee	Wasp	1,375	168.86	375
S. J. Wittman, Oshkosh, Wis.	Wittman Spl.	Cirrus	349	151.25	80	H. Lantz, Los Angeles, Cal...	Howard Spl.	Gypsy	326	123.11	250
Roy Liggett, Omaha, Neb.....	Falkert's Spl.	Cirrus	310	151.33	40						
Event 3. 550 Cu. In. Displacement						Event 14. 200 Cu. In. Displacement					
Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	202.51	810	S. J. Wittman, Oshkosh, Wis.	Popjoy Spl.	Popjoy	173	120.01	180
Roy Liggett, Omaha, Neb.....	Cessna	Warner	499 1/2	191.14	450	Lyman Voelpel, Chicago, Ill...	Tilbury Flash	Church	108	112.95	100
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	174.97	270	W. A. S. Studt, Davenport, Ia.	Church-Mid.	Church	108	82.98	40
G. Hague, Los Angeles, Cal...	K.-Ryder R1	Menasco	363	168.26	180						
Event 4. 1,000 Cu. In. Displacement						Event 15. 375 Cu. In. Displacement					
Lee Gehlbach, Oscoda, Mich...	Wedell-Wms.	Wasp, Jr.	985	199.14	900	Art. Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	190.95	360
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	188.46	500	Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	187.15	200
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	185.81	300	G. Hague, Los Angeles, Cal...	K.-Ryder R1	Menasco	363	171.07	120
						R. Hosler, Huntington, Ind...	Falkert's Spl.	Cirrus	363	170.70	80
Event 5. 200 Cu. In. Displacement						Event 16. 550 Cu. In. Displacement					
S. T. Wittman, Oshkosh, Wis.	Popjoy Spl.	Popjoy	173	106.55	180	Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	201.80	810
Lyman Voelpel, Chicago, Ill...	Tilbury Flash	Church	108	101.80	100	G. Israel, Robertson, Mo.....	Israel Racer	Menasco	544	197.73	450
W. Bagnick, Detroit, Mich....	Heath	Contin'tal	115	97.87	60	Art. Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	197.25	270
Event 6. 375 Cu. In. Displacement						Event 17. Frank Phillips Trophy Race					
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	176.25	360	J. R. Wedell, Patterson, La...	Wedell-Wms.	Wasp, Sr.	1,344	245.95	3,600
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	173.01	200	Lee Gehlbach, Oscoda, Mich...	Wedell-Wms.	Wasp, Jr.	985	217.48	2,000
G. Hague, Los Angeles, Cal...	K.-Ryder R1	Menasco	363	170.35	120	Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	215.15	1,200
S. J. Wittman, Oshkosh, Wis.	Wittman Spl.	Cirrus	349	161.20	80						
R. Hosler, Huntington, Ind...	Falkert's Spl.	Cirrus	310	156.26	40						
Event 7. 550 Cu. In. Displacement						Shell Straightaway Speed Dashes					
Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	195.94	810	J. R. Wedell, Patterson, La...	Wedell-Wms.	Wasp, Sr.	1,344	305.33	1,000
G. Israel, Robertson, Mo.....	Israel Racer	Menasco	544	184.54	450	R. Turner, Los Angeles, Cal...	"Ring-Free"	Wasp, Sr.	1,344	289.9	600
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	184.37	270	Lee Gehlbach, Oscoda, Mich...	Wedell-Wms.	Wasp, Jr.	985	272.06	400
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	183.02	180						
Event 9. 200 Cu. In. Displacement						Sweepstake Awards 2B. Events 2-6-10-15					
S. T. Wittman, Oshkosh, Wis.	Popjoy Spl.	Popjoy	173	110.17	180	Art. Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	....	360
Lyman Voelpel, Chicago, Ill...	Tilbury Flash	Church	108	105.99	100	Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	....	200
W. Bagnick, Detroit, Mich....	Heath	Continental	115	103.20	60	S. J. Wittman, Oshkosh, Wis.	Wittman Spl.	Cirrus	349	....	120
Event 10. 375 Cu. In. Displacement						Sweepstake Awards 3B. Events 3-7-11-16					
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	181.10	360	Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	....	675
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	179.37	200	Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	....	375
S. J. Wittman, Oshkosh, Wis.	Wittman Spl.	Cirrus	349	167.41	120	G. Israel, Robertson, Mo.....	Israel Racer	Menasco	544	....	225
R. Hosler, Huntington, Ind...	Falkert's Spl.	Cirrus	310	162.66	80						
A. Gross, Los Angeles, Cal...	Howard Spl.	Gypsy	326	150.71	40						
Event 11. 550 Cu. In. Displacement						Lap Prizes Event 17. Frank Phillips Trophy Race					
Roy Minor, Los Angeles, Cal...	Howard	Menasco	489	195.40	810	J. R. Wedell, Patterson, La...	Wedell-Wms.	Wasp, Sr.	1,344	....	1,666.70
Art Chester, Joliet, Ill.....	Chester Spl.	Menasco	363	187.26	450	R. Turner, Los Angeles, Cal...	"Ring-Free"	Wasp, Sr.	1,344	....	333.30
G. Israel, Robertson, Mo.....	Israel Racer	Menasco	544	182.89	270						
Lee Miles, Los Angeles, Cal...	M. & A. Spl.	Menasco	363	174.47	180						

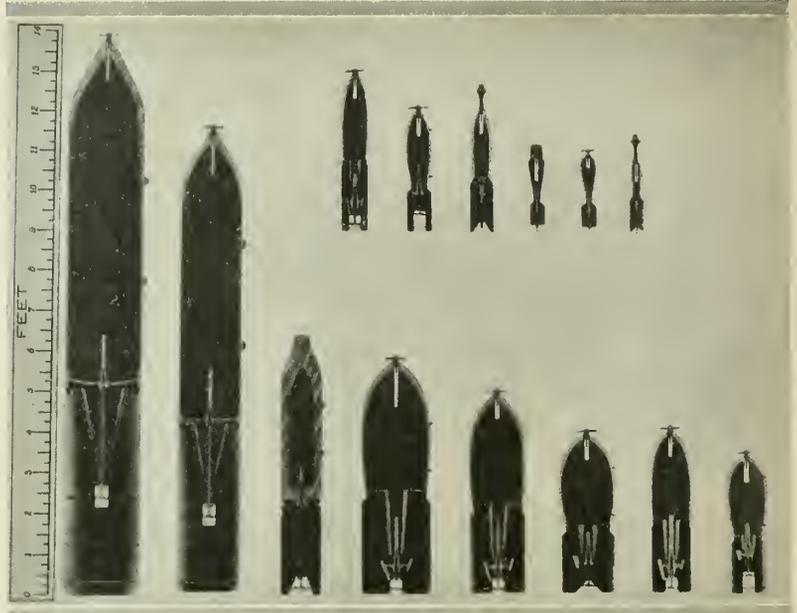


Bombardment Aviation

MAJ. GEN. JAS. E. FECHET
U. S. Army (Ret.)



The enormous size of these Army Air Corps aerial bombs is vividly portrayed by comparison with a man of average height. The 6-foot bomb is the 1,100-pound demolition, considered the largest practical size today. The larger bomb is the 14-foot 4,000-pound demolition developed by the Ordnance Department for experimental purposes by the United States Army Air Corps



A group of typical aerial bombs of the U. S. Army Air Corps. From left to right are the 4,000-pound and the 2,000-pound demolition; 1,100-pound armor piercing and 1,100-pound demolition; standard and thick-case 600-pound demolition; standard and thick-case 300-pound demolition. Above them are the standard and the thick-case 100-pound demolition, obsolete 5-inch and the standard 25-pound fragmentation; obsolescent 25-pound Cooper Mark III and 17-pound fragmentation Mark II A. The scale of feet at the left of the illustration shows the relative sizes of these bombs, the upper portions of which are shown in section to give an idea of their internal construction

• Of the four classes of aviation used for military purposes, bombardment aviation is now recognized as the basic arm, with pursuit, attack and observation aviation as supporting arms in fulfilling the mission of bombardment. Until the past few years it has been considered necessary to have two types of airplanes to fulfill the bombardment mission, namely, light and heavy bombardment. With the advent of the new high-speed, low-wing monoplane bomber, of which the Boeing B-9 and the Martin B-10 and B-12 are examples, the trend of thought has been that there is no need of differentiation between these two types.

The new high-speed bombers referred to above have essential characteristics which make them adaptable for carrying out any type of mission which would be assigned to bombardment. If it should become necessary to use additional equipment involving the use of light bomb loads, it would be possible to utilize the new long-distance reconnaissance airplanes now being produced for corps observation. This equipment has the necessary speed and carries a very useful bomb load, but does not carry the maximum load of which the new bombers are capable.

The present standard types of bombers used in bombardment units, the Keystone B-6, a biplane with two 575-horse-

power air-cooled engines, and the Curtiss Condor B-2, a larger biplane with two 600-horsepower liquid-cooled engines, are doomed to obsolescence when a sufficient number of the new types can be supplied to the tactical units. These bombers are capable of carrying a full load of bombs, but due to their slow speed can be considered at the present as only a good training type of airplane.

Characteristics of the Bomber

In order to better visualize the requirements of bombardment aviation, let us consider the characteristics of this type of airplane. The bombardment airplane should be as small as consistent with performance and load stipulations, that is, the smallest wing area that will get the required ceiling. Small size allows for easier housing and reduces exposure to hits by anti-aircraft artillery. It should be multi-engined, with no engine in the nose of the fuselage, due to the need of unobstructed vision.

At the present time the 2,000-pound bomb is the largest practical size, although the Ordnance Department has been experimenting with a 4,000-pound bomb. This size bomb is not considered practical, due to the fact that it is considered that greater destruction can be achieved by using two 2,000-pound

bombs. The old adage that it is not wise to put too big an egg in one basket is here applicable. Modern bombers should be capable of carrying a total bomb load of 2,400 pounds, made up in any of the following assortment of bombs:

One 2,000-pound; four 600-pound; two 1,100-pound; six 300-pound; twenty 100-pound bombs.

With this bomb load, bombers at maximum speed should be capable of going a distance of 400 miles and return. As the ratio of gasoline consumption to distance traveled at cruising speed is much less than at maximum speed, this radius of action will be increased by flying at cruising speed. With such a radius, a heavy bombardment formation could take off from a shore station, fly to a point two hundred miles at sea, engage an enemy fleet or expeditionary force for a half hour and return to its base, or some airdrome within a hundred miles thereof, should its own landing field be bombed by hostile aircraft.

High Speed Defense Against Gunfire

Speed is most essential in the design of a bombardment airplane. The new low-wing monoplanes are capable of attaining a speed of about 200 miles per hour at 15,000 feet altitude. This airplane will travel approximately 4,000 feet from the time an anti-aircraft gun is fired on the ground until the shell reaches the altitude of flight. It can readily be seen from this example what an advantage the high-speed bomber has in protection against anti-aircraft fire.

A high-speed bomber provides some defense from pursuit aviation, but assuming that pursuit is as fast as (or faster than) the speed of the bomber, the defensive power must be provided in the bombardment plane. The bomber's crew must be able to protect the airplane from hostile air attack and assist others in their formation during such attack. To provide this defensive power the bomber is equipped with a gun in the nose of the fuselage (forward of the pilot's cockpit), a gun in the rear cockpit, and a gun mounted through the floor of the rear of the fuselage. A gunner operates each gun emplacement, and these guns being on flexible mounts, it is possible to project the plane fire in all directions.

High Ceiling Desirable for Bombing

The element of surprise is essential to the success of a bombardment attack, and as a result, rapid strides have been made to reduce the noises resulting from engine exhaust, propellers, and vibration of wires. It has been determined that mufflers will cut down exhaust noises, geared propellers (large pitch, low r.p.m.) will reduce the noise caused by the propeller blades, and the monoplane type

of airplane practically eliminates the presence of wires from the air stream. This reduction of noises seriously hampers the work of anti-aircraft personnel trying to locate a bombing formation through their listening horns.

High ceiling and rate of climb lessens the chances of discovery by the enemy defense forces and interception by its pursuit. It also increases the errors inherent in the fire of anti-aircraft artillery at long ranges. A ceiling of 20,000 feet (with full load) is desired for heavy bombardment, and this is attainable by our present high speed airplanes.

Good Visibility Also Necessary

Another characteristic which must be considered is that of vision for the pilot and bomber. Both must have a constant and unrestricted view of the ground to insure efficient navigation and good bombing. The pilot must have good fore-and-aft vision to enable him to see other airplanes in the formation. There must be no blind angle that can not be covered by one of the two or more gunners.

The bombs carried by a bombing airplane are of the demolition type which contain a greater ratio of explosive to inert weight than do the smaller fragmentation bombs carried by attack airplanes. More than half the weight of a demolition bomb is that of the explosive, TNT. The cases are strong enough to stand impact upon and penetrate the surface of the various types of targets before being exploded by the slight-delay fuses. Incendiary and armor-piercing bombs are not used, as demolition bombs will also do their work to a degree which does not warrant such specialization in bombs. While the use of gas bombs is not contemplated under our present National Policy, it is essential that they be considered in the event that retaliatory measures are required against an enemy using them.

Defensive armament consists of machine guns. If the enemy pursuit at-

tacks with close range fire, the 30-calibre gun with its high rate of fire is the best for defense. If the pursuit attacks at long range, then the 50-calibre gun, although firing at a slower rate, will be best.

Airplanes on the ground, ammunition dumps, brick or concrete buildings, railway tracks and rolling stock, and smaller seacraft (such as submarines) warrant either the 100 or 300-pound size. It is often more advantageous to carry, let us say, ten 100-pounders than six 300-pounders, as three 100-pounders may be dropped in salvo if necessary to do the work of a single 300-pound bomb. Destroyers, aircraft carriers and transports would be seriously damaged by a 300-pound bomb, but probably sunk by a 600-pounder, although one 300-pound bomb dropped on the flying deck of a carrier would destroy its value as such. For cruisers, the 1,100-pound bomb would be most efficient, and considering the importance of an aircraft carrier, it might be well to use a bomb of this size on such craft and be surer of rendering it useless. This same size bomb would also be used on pier-supported concrete bridges, subways and steel railway bridges. The 2,000-pound bomb would be necessary against massive concrete bridges supported by piers and suspended by cables, structures with heavy foundations, and also against battleships. It is not necessary to sink a battleship to make it a casualty. Mangled propellers will put it out of any but stationary action.

In this article only a sketchy picture has been portrayed of the importance of bombardment aviation and the machine with which this mission is to be fulfilled. It can be seen that the targets presented for the bombardment airplane to destroy are innumerable and that the bombardment airplane must be a very complete and finely-organized piece of equipment in order to give the results desired. There are still many refinements to be made and progress along these lines has been rapid and steady toward obtaining the ultimate results.

EDITORIALS

"Safety is, and shall continue to be, our paramount consideration, to be guarded at all times with the utmost care and solicitude, and I wish to say that so long as I am Secretary of Commerce no step will be taken that will in the least jeopardize the safety of air travelers."—SECRETARY OF COMMERCE ROPER.

Making Headway Over Politics

• The selection by the President of Eugene Vidal as chief of our civilian aviation would seem to indicate at last that the much referred to New Deal is also to include a new deal for the commercial aeronautic activities of the country.

In recent months there was every indication that the New Administration, in its efforts to deal with civilian and commercial flying activities, was nose-diving into a lot of trouble. It was gratifying to note that President Roosevelt was quick to perceive the trouble and acted promptly in the emergency.

Although the job he does and the manner in which he handles the grave responsibility which the Executive has conferred upon him can be the sole ultimate judgment of the correctness of the President's new selection, we feel confident that Gene Vidal, with his practical experience in airline operation on the eastern seaboard, will enter upon his new duties with the support and good wishes of everyone in aeronautics.

And while we await proof of the soundness of the President's judgment, it is great satisfaction to note that in making the appointment President Roosevelt declined to heed the siren call of politics and that several "well-recommended" (by politicians) candidates were passed over in filling this most important of government posts. There has been quite enough of politics already in the New Administration's handling of our national aeronautic problem. We sincerely hope that this may be taken as an indication of the end of it.

trade of importing without benefit of tax payments will assume a new and different aspect than it has held for a decade or more. Violation of a law unpopular with the people who imposed it will no longer be the order of the day. The viewpoint of those burdened with the new duty will be that of defenders of our tax structure. Smuggling will again become the ugly word smuggling, and nothing more.

Now in the period which has witnessed the change in the popular conception of this word, flying has come to assume an important part of the activities of the Coast Guard. The men of the Coast Guard a few years ago took to flying as a duck takes to water. They have handled their equipment well and they have demonstrated clearly the value of the airplane to civil defense of our seacoasts.

Proof of how well they have done this job is contained in the recent government announcement that as we prepare ourselves for the new special defense against smuggling and tax evasion, which will come after Repeal, a considerable outlay is to be made to equip the Coast Guard with aircraft. The men in American aeronautics owe the Coast Guard a note of thanks for the manner in which they have taught the lesson of the value of aircraft. They are entitled to full praise by the American people for the way in which they have adapted themselves to flying and in turn adapted and made use of the science of aeronautics to the defense of the interests of their country.

The Navy Sets A New Mark

• In the special flight activities of recent weeks, none stands out for special mention.

pilots were capable of such feats as these. Commander Carpenter and his men are to be thanked for correcting this erroneous mass supposition. They are also to be congratulated for dealing so effectively a blow at those sceptics who are in the habit of going about scoffing at aviation and asserting that long-range formation flying is a dream of the enthusiasts.

In reviewing this flight we also note another new situation—there seems to be a change for the better in the Navy. The day seems to have passed when the Navy talked largely of what it was going to do and then failed ingloriously in the doing of it.

This change of policy is in a large measure due to the new spirit which has been injected into the personnel through the good offices of Secretary Swanson. The opportunity has been created for further demonstration of the real value of wing power with our armed forces afloat. The Navy, by this flight and the one planned from the Canal Zone to San Diego, has shown again the importance of air forces operating in conjunction with sea power.

The Value of United Action

• While price regulation and stabilization are being so widely discussed and approved as a means of solving some of our domestic ills, we are wondering if a little of the same practice could not be successfully employed in creating better foreign markets for our airplane industry.

It has long been a noticeable fact that in foreign sales fields, such as Latin America and the Orient, England, France, Germany and Italy have stood as individual units when it came to offering air equipment for sale. All English sales forces stood together, agreeing unequivocally as to price and services offered. Likewise the French and Germans. But not the Americans. That old Washington lobby trick of sneaking in and out of back doors to lay secret cut-throat offers at the feet of shrewd foreign buyers seems to prevail. The foreign buyers grin and appear to like it.

The practice may in some instances result in showing a favorable foreign trade balance to our account, but we doubt if it can be a very substantial balance. The time has come for American manufacturers to agree upon prices and practices at home and to present a unified front in the battlefield of foreign markets.

You Can Sell it . . . but *How?*

CHARLES J. CUTAJAR

● You stroll past the long row of hangars at a leading airport. Here, a number of aircraft manufacturers are represented. You are told that Dealer Jim Blank has chalked up a few sales this year. Jim greets you with the expansiveness that marks the airplane salesman. How, you query, is a good prospect for an airplane to be found these days? Jim's cheery smile fades. He becomes thoughtful. There is a hint of wariness. He would rather not discuss that particular point . . . competition is keen . . . sort of a company matter, you know—confidential. You talk of other things—and wander down to Joe Blank's hangar.

Joe has sold a few also. He generously praises Jim. Jim is a live wire, a good salesman. Maybe he is a bit too—well, some of his methods come pretty close to the line. But let's forget Jim. How is Joe doing, where does he dig them up? Joe's expression undergoes a subtle change. Yes, the season has been a tough one but he's been able to knock one over every so often. How? Tell you what, just let him off on that question and he'll be glad to answer all the others. You ease along to Fred's place. Fred has sold only one plane this year but it seems that the circumstances leading to that sale are a bit of a mystery, too. He hates to rush away, but a prospect-student is waiting to go up—please excuse him. Likewise, good old Harry. He has sold two. But Harry also is a bit vague about the ways and means of getting business.

It's a Secret

Yes, Reader, just how the boys get customers for dear old Meadow Lark, Wombat Wing or Blue Buzzard, is pretty deep stuff, or at least it's not for publication. It's just a great big secret! And so? So the grand total of sales of new aircraft for private and business ownership, achieved by methods so remarkable that not a hint of them may be given, was *well under* 200 airplanes of all makes for the first seven months of 1933. Boys, you can keep your secrets! Good luck and God bless you.

But your Old Sleuth is not easily

foiled. Donning a set of chin shrubbery and a pair of dark cheaters he continued to invade the haunts of the aircraft salesman and by approved "under cover" methods involving much dodging behind hangars, watching ground mechanics and "making up" to lunch counter waitresses he picked up quite a bit of inside stuff. Piecing together a scrap of information here, a bit of gossip there, an occasional unguarded statement of some higher-up, reported third hand, he built up gradually what might be called a very Distinct Impression. Only an impression of course and possibly an ungenerous one, but one nevertheless that must be reckoned with. It is, briefly, that most of the sales to new owners (exceptions you could put in an ant's eye) have been to individuals who have been attracted by whatsoever reason to the centers of flying activities. After a few indiscreet inquiries and possibly a flight or two or even after having enrolled for flying instruction, all such are promptly ganged by aircraft salesmen who have a sixth sense for spotting the prospect, once the prospect is voluntarily exposed to view, in broad daylight, at the flying field.

The Circle of Sales Activity Must Be Enlarged

As to present and previous owners, who purchased about half the new planes sold this year, they of course were targets for marksmanship as plainly in view as an iron stag on a front lawn. The conclusion is (let us know if we are wrong) that there is very little chasing of the fly by the spider until the fly decides to meet the spider half way. This policy let us admit, may have served as well as any during this spring and summer but will certainly prove inadequate next year.

So this will be a good time to start from scratch in considering ways and means of building the market.

The principles of sales promotion are much the same whether you are selling beer, bonds or planes. You get your story before the right people, all of them. You give special attention to the more likely prospects. Those who register interest become your first line objectives. Those whom you sell you also continue to serve so that they may stay sold and re-buy. In these stages the problem must be approached.

Reaching the Right People

It is in the first stage of getting the story before the right people—all of them—that those engaged in the marketing of private aircraft seem weakest in this season of renewed opportunity. Yet, what an advantage there is in having a story to tell which is so rich in news value, so replete with showmanship. Every flight made for business or pleasure is an occasion of interest not only to pilot and passengers and to their friends and associates, but to those who view the start and arrival, who observe the plane in the air or even who learn of the flight indirectly. Not even in the early days of the automobile has the news of an industry been followed with such genuine interest by "the right people."

But even news which contains the germs of such splendid sales material must be indoctrinated if consumption and comprehension are to lead to buying activity. Ordinary publicity through news columns, concededly valuable, has little stimulated the growth of the market for private aircraft. Sheer selling appeal through advertising must be counted upon to accomplish the job as it has without

4th article of
the series on "Aircraft Marketing"

exception in every other modern industry, be the product tractors or cellophane.

But, some one is sure to say, look at all the aircraft advertising done three years ago—and what did it accomplish? Why even look at the extensive advertising done by so-and-so during the past year, and see where they are! Guess we'll continue to snoop for sales.

Aircraft Advertising Pays

Now Gentlemen, advertising, in itself a billion dollar industry, is too widely accepted as a business necessity to be dismissed with any wave of the hand. Hind-sight has shown that you couldn't even sell cars, pianos, real estate or securities in 1930, much less an unfamiliar and costly product. If you overestimate your sales potentials and overspend for advertising, or if you try to unload a mountain of "dated" equipment at ridiculously high prices, in short, if you set an impossible task for advertising, it will fail.

On the other hand if your ship is designed and built in accordance with known preferences and if your sales quota is reasonably based upon scientific analysis of your market you can employ advertising as an integral part of your selling effort with the knowledge that it will broaden your market and lower your selling cost. Right now several aircraft manufacturers report substantial inquiries from soundly conducted advertising in aeronautical publications and incidentally they are the manufacturers who are showing their heels to the rest of the industry. Even back in the dark days the writer has known of some remarkable results from aircraft advertising, including the classical instance of the sale of a \$17,000 airplane sight unseen, direct from a publication advertisement. ("Vas you dere, Sharlie?") If the product is saleable you can get results through advertising, or there is something wrong with the advertising.

Know the Prospect

But before advertising, before any sales promotion is undertaken, you will clearly define your prospects to avoid misdirecting your attack or wasting your resources. Sales research will be your one reliable guide. Cross sections of all important groups of prospects (see second article of this series, in August AERO DIGEST) will be scrutinized, tested and evaluated. Direct contact with representative individuals by personal investigator, by phone or by mail will establish with surprising accuracy the value of the group as a whole as prospects for you.

This work can be done by competent research organizations at 25c to \$1.00 per call depending upon the nature of the list, plus 25% for tabulation and report, if desired. Telephone surveys are half this cost. Surveys by mail are even less. You will cross-check your lists to estab-

lish common denominators of age, character, income, occupations, pursuits and habits as far as this is possible although you will find, as you have found, that the aircraft prospect is hard to standardize. In every way you must endeavor to know and to cultivate the man or woman who might be sold (some of the airlines are ahead of you there) and your success in this will depend upon intelligent and unremitting search.

With your prospects defined, you are in a position to estimate your market potential, plan production, establish your price for profit, budget your sales expenditures and set up your appropriations for sales promotion and advertising.

Adequate Appropriations Needed

There are as many ways of fixing appropriations as there are ways of skinning a cat. In a recent survey of national advertisers, 49.8% were found to base budgets on the amount needed for "an adequate campaign"; 31.2% on a fixed percentage of estimated sales for the year at hand and 9.3% on a fixed percentage of sales for the previous year. Many advertisers now revise their budgets semi-annually, quarterly and even monthly. In general, an increasing number of advertisers are basing their appropriations on the task ahead; are keeping budgets flexible to meet changes; are setting up contingent funds for special opportunities or needs. They are substituting the rule of common sense for the rule of the thumb.

What percentage of income on aircraft sales should be allowable for advertising and sales promotion? That question won't be settled for years to come. The practice in other industries, while hardly furnishing the key, may provide helpful clues. Some of the more typical apportionments are: petroleum products, 11%; radio equipment, 7.25%; electrical appliances, 8.5%; building specialties, 6.75%; automotive equipment, 4.57%; automobiles, 4.5%. Mind you, these are the ratios of expenditures in fully established industries. When the automotive industry was in a stage of development comparable to the present in aviation, expenditures up to 12% were in order. It was wisely recognized that adequate promotion was essential to establish widespread public acceptance and all other requirements were scaled down to provide the vitally necessary advertising appropriations.

Airplanes are and will continue to be harder to sell than automobiles. During these fledgling years, expenditures for advertising and sales promotion up to 15% of gross income should not be unthinkable. How does this compare with the existing practice? Present expenditures as a rule do not exceed 6% of volume and in most cases the rate is well under this figure, on a basis of sales to

private and commercial owners. If sales to governments and transport lines were taken into consideration, the industry as a whole does not spend 2% for advertising and sales promotion! Aeronautical advertising is and always has been underpowered. It suffers from a general lack of volume so necessary for impression in a country as vast as ours and with so many other interests competing for attention. It is a matter that calls for serious consideration.

Assuming that we have surveyed our market, set our sales quota and earmarked some money to do things with, we must now formulate the message itself. Let's look about. There are numerous articles now in common use—such as portable typewriters, mechanical food mixers, parchment paper for cooking, heat regulators (air conditioning on the way), dozens of others you could name, all but recently known, which were successfully established only after the public had been made to understand just how these products *usefully serve*. That is our clue number one. Clue number two lies in the known fact that the automobile people did not get going until they had let the public in on such important facts as the life of a car expressed in miles, cost per mile of the car and all its replaceable features, gas, oil, tires, etc. Until the enigma was changed to everyday knowledge there was no general acceptance of the automobile. That gain was consolidated by the thousand-dollar car.

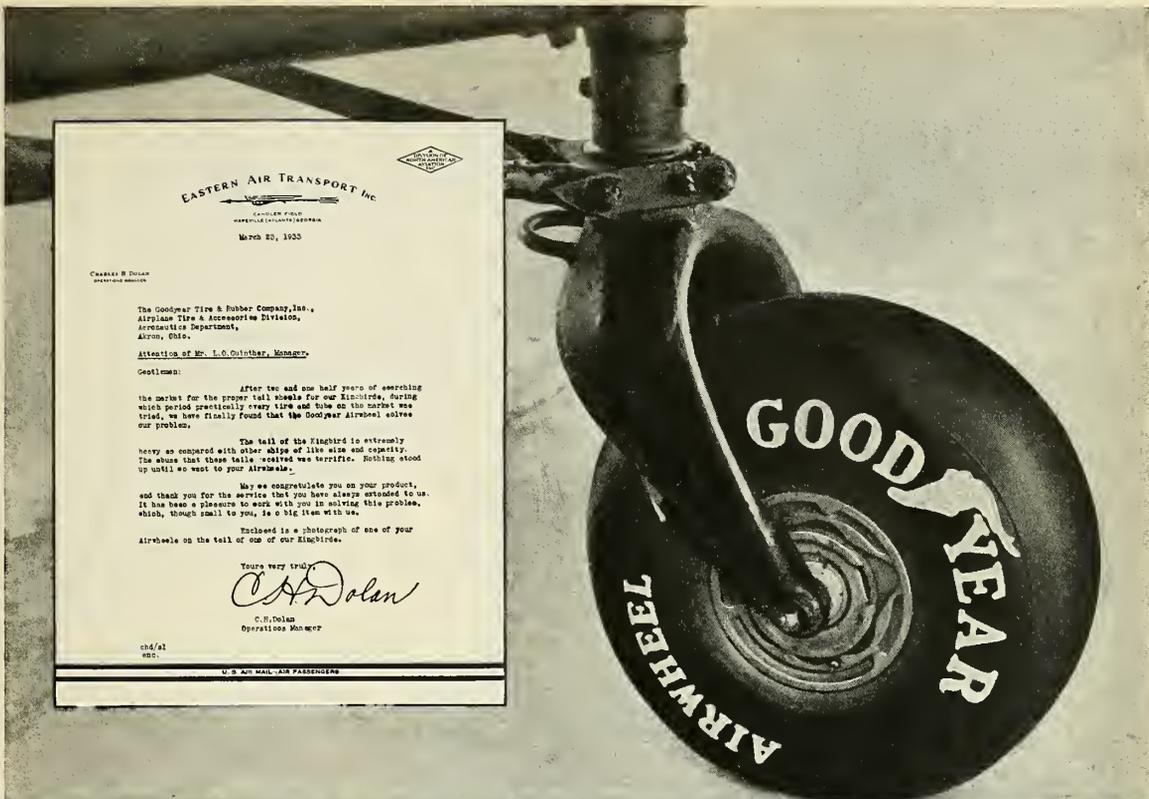
Sell Plane Ownership Realistically

If there is a lesson in this, it would seem that aircraft advertising must first of all feature the uses (*not* characteristics) of an airplane and, secondly, do away with all mystery as to piloting, the costs per mile of flight travel and the expense of upkeep and maintenance. "What is it for, how do you use it and what does it cost to *run* (not *buy*) it?" That is what John Public and his wife wants to know about almost anything—airplanes are no exception.

As to structural and flight characteristics or comparative data—these are just details. Yet this is the stuff that most aircraft copy is still made of. Why? Do aircraft manufacturers suffer from a Mother-Aviation fixation to an extent that they are unable to bring themselves to address beautiful Miss America in a manner which she will respond to? To most men and women, aircraft ownership is still a thought so foreign to their daily lives that only sheer, brilliant *realism* (not *imagination*) in aircraft copy can stir even the least desire to own a plane or the faintest understanding of how it might agreeably serve them.

Let's get some *lure* into the thing, and then test all copy for effectiveness, checking and rechecking, by consumer

(Continued on following page)



What EASTERN AIR TRANSPORT...

found out about TAIL WHEELS

THE best way to tell this story is to quote from the letter above.

"After two and one-half years of searching the market for the proper tail wheels for our Kingbirds . . . we have finally found that the Goodyear Airwheel solves our problem.

"The tail of the Kingbird is extremely heavy . . . the abuse that these tails received was terrific. *Nothing stood up until we went to your Airwheels.*"

There's not much to add to that — except that Goodyear, with the Airwheel and Airwheel Hydraulic Disc Brake has solved the tough landing, taxiing and take-off problems for some of the largest air transport companies. It's a mighty good idea for you to know what this equipment can do for you. Why not write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California?

THE GREATEST NAME IN RUBBER

GOOD YEAR

WHEN YOU BUY A NEW SHIP SPECIFY GOODYEAR AIRWHEELS

(Continued from preceding page)

juries, pre-runs, coupon and inquiry counts and analyses, memory recall, consumer recognition, psychological scoring factors, hidden offers, timed attention or any other good method developed by the testing sharps. The Psychological Corporation in exhaustive tests finds that four-fifths of ads usually fail to click. How important is it, then, that aircraft advertising, contending with the mightiest sales resistance of all, should leave nothing to be desired in soundness of conception and skill in execution. Look to your copy!

What Media Shall Be Used?

With the message perfected, the selection of media becomes the next task. You will be guided of course by the extent of your selling operation as determined by your sales quota. Aeronautical publications have carried the bulk of the publication advertising this year. It is fortunate that they are peculiarly fitted for the purpose when available funds do not permit the use of more general media. Even in the years when class and general publications carried considerable aircraft advertising, the journals of the industry carried a full quota of "consumer copy" as well as advertising directed primarily to the industry. It is recognized that they are to an extent lay publications as well as trade publications for the private flyer is often an avid student of aviation and finds much of interest in reading journals devoted to his or her favorite pursuit. It may not always be so, but aeronautical publications still have first call on the advertising dollar on a basis of reaching a concentration of prospects at low cost.

When appropriations permit the use of general media the selections will be determined by rigid circulation analysis. The yardstick will be your consolidated prospect list. High class publications with sports interest will be studied. Large national publications, particularly those carrying an impressive amount of automobile advertising, must be considered. Sophisticated publications of strictly local interest and circulation should be useful, especially with effective dealer cooperation. Radio broadcasting, although a better "buy" by 50% than five years ago may have to wait a while longer. Other media such as outdoor advertising and car cards are still doubtful.

One of the most effective and reliable weapons will continue to be direct-by-mail advertising. By this means you can concentrate on worth while groups of proven merit and experiment from time to time with groups of "suspects" without undue cost. In these days of cyclonic changes, your mailing lists should be kept up to the split second. An unrevised prospect list of a couple of years standing is as useful today as last week's newspaper.

If it is a list of individuals it will be at least 75% out of date; if a list of firms the mortality will likely be 25% to 40%. As a prominent publisher recently pointed out "the rich are always with us," but the number of replacements in the ranks these days is huge. Likewise the status of the prospect in all other respects is subject to constant change.

Your direct mail activities will embody several plans. You will have one for following up inquiries, one for "hot" prospects to supplement the salesman, one for cold canvassing of random groups and special plans for special groups. Your most important material will *not* be your catalogue but will be personalized letters accompanied by occasional inexpensive material such as unusual testimonials, storiottes of typical owners, news clippings, reprints of advertisements, miscellaneous information and suggestions in a variety of forms.

Should you offer a meaty digest or guide of general interest to people interested in flying, such as a serviceable airport map for the private flyer, descriptions of a number of air tours of specific duration or mileage, a pamphlet on the proper care of an airplane, a list of economies that could be effected in operating a private plane, you will receive generous returns and will win many friends.

Numerous forms of mailing pieces will have your consideration. There are illustrated letters, Jumbo letters, miniature letters, house magazines, miniature newspapers, die cut folders, self-mailing folders, facsimile hand written letters, broadsides, dual-use letters, French fold letters, "step-off" booklets, post cards, unbound folders, nests of photos, top-fold letters, zig zag folders, novelty letters and many other pieces. For aircraft selling we should suggest the simpler forms with *ample* wording and *ample* illustrations. Tell the story fully. It will take a lot of selling; and clever brevity will get you nowhere.

If you are addressing business people you might take a cue from Packard and have your president, treasurer or salesmanager appeal directly to the corresponding official in the prospect organization.

System Counts in Conducting Direct-Mail Activities

Compilation and record keeping are important. Delays are fatal. A hundred and twenty-three advertisements offering samples or booklets were recently answered to determine the interval before reply. Thirty-one replied within a week; 53 within two weeks; 27 within three weeks and the remaining 12 from four to six weeks. In 40% of these cases some reader interest, if not good will, was undoubtedly lost simply because the mailing departments needed a major overhaul.

To avoid needless disorder and waste, install practical systems and methods at the start. There are direct mail associations, expert operators and equipment manufacturers who will be glad to guide you in this.

Above all your mailings must be geared to the activities of your salesmen and dealers. Lack of prompt, concurrent personal selling effort will largely nullify the sales efficiency of all promotional work. Not only should your dealers be informed of all material being sent out from the sales office, but much of the material should be mailed directly from the dealer's office.

Dealer cooperation is best assured when the dealer pays his share of the expense of local mailings and local newspaper advertising. Though this policy is becoming optional in the automobile field where formerly it was required, it is still general and assessments average around \$25 for the more expensive car brackets. Ford dealers are advertising aggressively this year and in some sections several hundred of them band together for group promotion. It is to the distinct advantage of the aircraft dealer to coordinate his promotional activities and expenditures with those of the manufacturer, on a cooperative basis.

Showmanship Helps

A nice bit of showmanship was displayed by a highly successful distributor this spring in the form of a "new model show" held in his hangar. There was good showmanship when fourteen women fliers carried the Blue Eagle over New York City, bringing the NRA drive home to the people by dropping floral tokens into the streets. There is always good showmanship in aviation club activities, particularly in the organized air cruises, treasure hunts, etc. There's good showmanship in the presence of planes at fairs and gatherings other than the industry's own events, in talks before clubs and associations, schools, colleges and business groups.

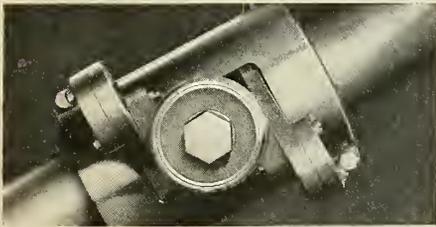
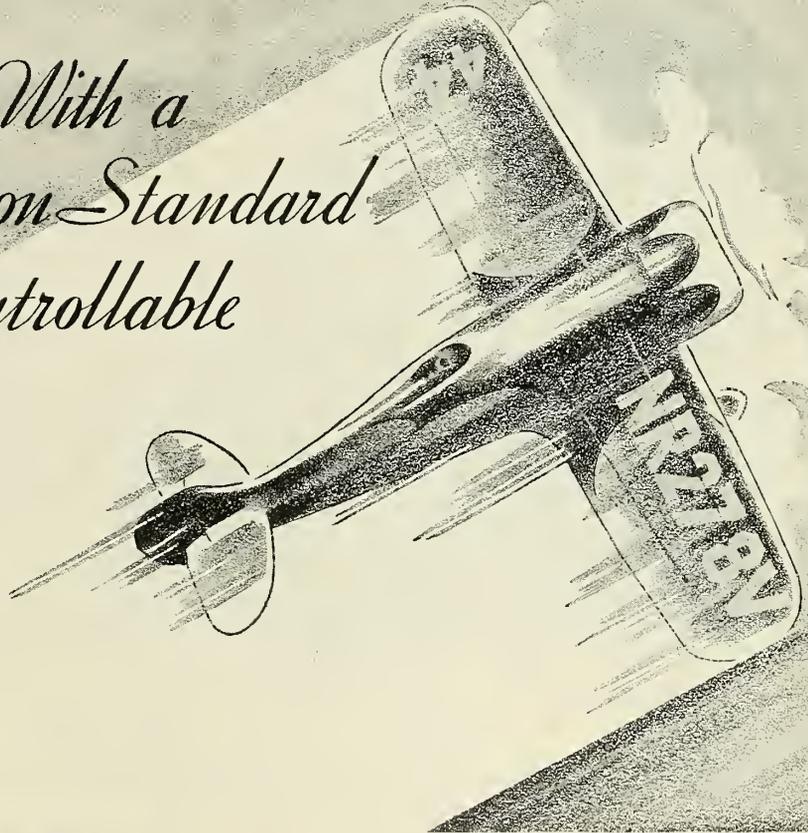
Hand in hand with good showmanship is good publicity—not of the dramatic but of the *usual* in private flying. News of plane owners should appear regularly in the sports sections of the newspapers. And why are there not more good articles in popular magazines of large circulation about every-day private flying which is infinitely more interesting than coast-to-coast records? When you are selling an idea, it is well to have the buyer think it was *his* idea from the start. Buyers get ideas from showmanship and publicity, *if the association of ideas is close enough to their own desires and purposes.*

Random thoughts from here and there: The dealer who allows a prospect to use a plane on trial at hourly rates which are credited against purchase price; the pros-

(Continued on page 62)

World's Fastest Land Plane

*With a
Hamilton Standard
Controllable*



The Hamilton Standard Controllable is simple in operation and rugged in construction. Hydraulic operation in conjunction with centrifugal counterweights insures smooth, positive action in changing the pitch at will to meet the conditions of take-off or extended flight.

Averaging 305.33 miles per hour for four runs over an official 3-kilometer course, James R. Wedell established a new world's speed record* for land planes at Chicago on September 4. His plane was a Wasp-powered Wedell-Williams Special, equipped with a two-bladed Hamilton Standard Controllable Pitch Propeller—the controllable that has proved its dependability in the day-by-day service of the world's leading air lines. *Record subject to official confirmation



HAMILTON STANDARD PROPELLER COMPANY

EAST HARTFORD, CONNECTICUT

SUBSIDIARY OF UNITED AIRCRAFT AND TRANSPORT CORPORATION

AIRLINES and AIR TRAVEL

Airlines Set Individual Records

FURTHER GAINS in passenger traffic were recorded by American transport lines during the month of August when many of the major companies exceeded the record high marks of the previous month.

The transport divisions of North American Aviation, Inc., reported mounting traffic figures with Eastern Air Transport flying 9,200 passengers during the month and Western Air Express reporting a gain of seven per cent over July figures. Transcontinental & Western Air, the "Lindbergh Line," also reported favorable increases in mail, passengers and express.

American Airways topped its July figures by carrying 14,397 passengers, while United Air Lines maintained its position at the head of the carriers with 17,538 revenue passengers.

United Orders Oil Supply

UNITED AIR LINES has awarded an order for approximately 300,000 gallons of lubricating oils, a year's supply, to the Penzoil Co. One of the three-mile-a-minute United Air Lines' planes, with two 550-horsepower Wasp engines, consumes sixty gallons of gasoline and six quarts of oil per hour. A twenty-hour coast-to-coast flight of one of these planes requires 1,200 gallons of gasoline and thirty gallons of oil. United Air Lines' gasoline requirements of approximately 8,000,000 gallons a year are supplied by the Standard Oil Co.

Clement Resigns from TWA

AFTER SERVING his company for the past five years, T. B. Clement, vice president in charge of traffic of Transcontinental & Western Air, Inc., resigned his position to enter business for himself.

With the announcement of Mr. Clement's resignation came a change in personnel. Joseph W. Brennan, former traffic manager of the eastern region, is now general traffic manager and P. B.

Sturgis, formerly assistant to Mr. Clement, has taken over Mr. Brennan's position with headquarters in Pittsburgh. Other changes included the appointment of H. W. Beck as assistant general traffic manager and A. J. Donahue as assistant traffic manager of the eastern region.

GRAF TO FLY PASSENGERS FROM U.S.

FOLLOWING ITS scheduled visit to the Century of Progress Exposition in Chicago, the German dirigible *Graf Zeppelin* will return to Europe from Akron, Ohio, on October 28, carrying a limited number of passengers. The rates, lower than ever before, are \$600 per person to Seville, and \$650 to Friedrichshafen.

On September 18 the ship completed five years of regular passenger and mail service.

Add Grand Island to Mail Route

EFFECTIVE SEPTEMBER 20, United Air Lines included Grand Island, Neb., as a regular stop in its Chicago-San Francisco route operating as AM-18. Eastbound planes leave Grand Island at 10.50 a. m., while the westbound planes leave at 8.38 p. m.

Average Passenger Flies 327 Miles

STATISTICS ISSUED by the Department of Commerce, Aeronautics Branch reveal that the average length of trips made by schedule airline passengers during the first six months of 1933 was 327 miles. The highest average previously was 282 miles.

The average cost of a trip on an airline has remained constant for the past two years at 6 1-10 cents per mile. Contrasted to previous years, however, the cost of air transportation has dropped noticeably. The highest rate was 12 cents per mile in 1929.

Pilots Gain Point in NRA Code

DEPUTY ADMINISTRATOR Malcolm Muir at the Air Transport NRA Code hearing in Washington ruled that the years of preparation required to learn the craft and the special qualifications needed for flying commercial planes put pilots in the professional class and therefore excluded them from the ordinary laboring provisions of the NRA code. Muir deleted the entire section in the Aeronautical Chamber of Commerce's code dealing with pilots. The pilots were at odds with the operators over the question of pay, flying hours and the general status of fliers.

The clause asking that new lines be denied the right to fly over routes which parallel established routes was also eliminated by Muir following arguments by Amelia Earhart, who said that such provision would hinder the growth and advancement of aviation.

Varney Line Discontinues Service

ONE of the pioneer air transport operators of the West, Walter Varney, has discontinued Varney Speed Lines serving Los Angeles and San Francisco. Announcement of the closing of the service was made by Franklin Rose, president of the company.

Sole Appointed Air Mail Assistant

ALVA SOLE has been appointed assistant superintendent of air-mail for the Post Office Department in charge of the Southeastern airmail district of the United States. The district has its headquarters in Atlanta and takes in the territory from Richmond, Va., to Miami, Fla.

Sole was president of the Washington, D. C., Air Legion, an organization with the "share-expense" complex, which soloed 35 members during its first year of existence, Sole being the first.

American Airways Lockheeds Faster

CRUISING SPEED has been increased from 180 to 200 miles an hour in the new Lockheed Orion monoplanes being built for American Airways. Six of these planes are now being delivered to the company at the rate of one a week. The new model is similar to the original Orion and is powered with a P. & W. Wasp S1D1 engine supercharged to develop 550-horsepower at 2,200 r.p.m. at 7,000 feet.

The cabin, behind a single-pilot cockpit, is furnished to accommodate four passengers. Compartments provide space for two-way radio equipment and mail and baggage. A Smith controllable pitch propeller has been adopted as standard equipment on the plane.

(Continued on following page)



Finishing one of six P. & W. Wasp-powered Lockheeds for American Airways

PAYLOAD

2400
LBS.



- High speed with substantial payload — that was the combination sought by engineers when they set about designing the new Boeing 247 transport. The result: a cruising speed of 171 miles an hour with a payload of 2400 pounds! And that payload is *all* payload, including ten passengers, their baggage and 400 pounds of mail and express. Weights of pilots, stewardess, comfort features, navigational aids, etc., are not included in the 2400 pound payload figure.
- It is the combination of high speed, large payload, exceptional strength, maximum passenger comfort and operating economy which marks the Boeing 247 as outstanding — which makes it truly “tomorrow’s transport today.” Write for detailed specifications. Boeing Airplane Company, Seattle, subsidiary of United Aircraft & Transport Corporation.



BOEING *has always built tomorrow's airplanes today!*



(Continued from preceding page)

California Line Is Established

THE COAST CITIES of California situated along the historic Mission Trail were given direct air transportation, linking them with the major transcontinental lines, when Pacific Seaboard Air Lines, Inc., inaugurated a service twice daily north and twice daily south recently between Los Angeles and San Francisco. Bellanca planes carry passengers on this new inter-city service, which serves Santa Barbara, Santa Maria, Paso Robles, San Luis Obispo, Monterey-Del Monte, Salinas and San Jose. Carleton Putnam of New York, N. Y., is president of the new line.

New Marks Set In Air Transport

A NEW HIGH for the transportation of passengers was reached during the month of July, according to figures released by the Aeronautical Chamber of Commerce. Passengers carried totaled 62,683, the greatest amount ever carried during a single month. This brought the cumulative total for the first seven months of the year to 291,758, an increase of slightly more than 5 per cent of the total for the same period last year.

Scheduled mileage for the first 7 months of 1933 was slightly over the total for the first 7 months of 1932 with 30,855,807 miles scheduled. Miles flown was up to 28,889,349. While air mail, at 4,239,026 pounds, was less than last year, nevertheless increases during the past months have been satisfactory enough to warrant the hope that by the end of the year as much mail will be carried in 1933 as was carried in 1932.

Passenger mileage gained slightly and air express rose nearly 24 per cent above the first 7 months of 1932 when it registered 968,115 pounds. Gasoline and oil

consumption also showed gains with 14,390,964 and 421,972 gallons, respectively.

A comparison of the first 7 months of 1933 and 1930 shows: Miles scheduled, 30,855,807; 16,277,875. Miles flown, 28,889,349; 15,322,891. Mail (pounds), 4,239,026; 4,770,870. Passengers, 291,758; 237,094. Passenger miles, 93,986,482; 58,390,152. Express (pounds), 968,115; 161,734. Gasoline (gallons), 14,390,964; 6,203,113. Oil (gallons), 421,972; 196,438.

TRANSPORT LINES INCREASE PERSONNEL

ABOUT 500 more persons are now being employed by American-operated airlines than there were a year ago in June, 1932, according to the Aeronautics Branch, which listed 5,997 persons thus engaged on July 1, 1933.

Of this number, 575 were pilots, 192 co-pilots, 2,236 mechanics, 1,613 hangar and field personnel, and 1,381 office personnel. There were 36 less planes in service this year as compared with last, when 558 were flying.

Airline Establishes District Offices

CONTINUED GROWTH of air transportation business on the lines of American Airways throughout the country has made necessary the establishment of five district offices to handle the business formerly directed in Chicago.

The district offices and the men in charge of them are as follows: Chicago, Charles Rheinstrom; New York, G. K. Murphy; Cleveland, Joseph Sabin; Atlanta, Willis Haviland; Dallas, J. Lyles.

E. A. T. Flying Passengers at Night

INAUGURATING its first night passenger flight, Eastern Air Transport is now operating between New York and Atlanta on an after-dark schedule. Daylight service between the same points was speeded up to save 1 hour 20 minutes.

The 18-passenger Wright-powered Curtiss Condors are being used over the route. One leaves New York at 9.40 p. m. and arrives in Atlanta at 5.20 a. m. the following morning, while another leaves Atlanta at 7.20 p. m. and arrives in New York at 5.00 a. m. the following morning. Stops are made at each of the regularly scheduled points.

Patterson Heads United Divisions

W. A. PATTERSON was elected recently as president of Boeing Air Transport, National Air Transport, Pacific Air Transport and Varney Air Lines, divisions of United Air Lines, to succeed P. G. Johnson. Mr. Johnson resigned the presidencies of the four operating companies upon assuming the executive office of the parent aircraft corporation. Two new vice presidents of United Air Lines were elected: D. B. Colyer, formerly vice president of the western divisions, and Thorp Hiscock, in charge of technical development.

Mr. Patterson became assistant four years ago to Mr. Johnson, then president of the Boeing Airplane Co. and the Boeing Air Transport and affiliated routes at Seattle, Wash. With the organization of United Air Lines as the operating company for United Aircraft and Transport Corp.'s lines, Mr. Patterson went to Chicago as assistant to Mr. Johnson. He was later elected vice president of United Air Lines.

Announcement was made that Frank Caldwell will become manager of operations of the western divisions of United Air Lines, with headquarters at Cheyenne, succeeding Mr. Colyer, and Leslie G. Hubble, field manager at Seattle, will succeed Mr. Caldwell in the position of general superintendent.

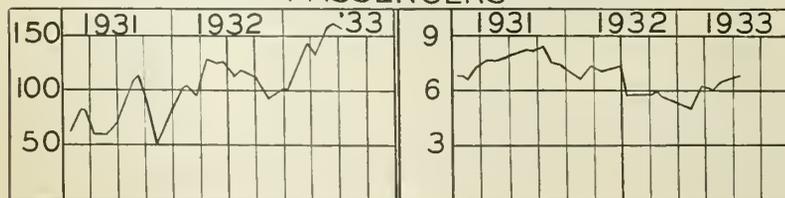
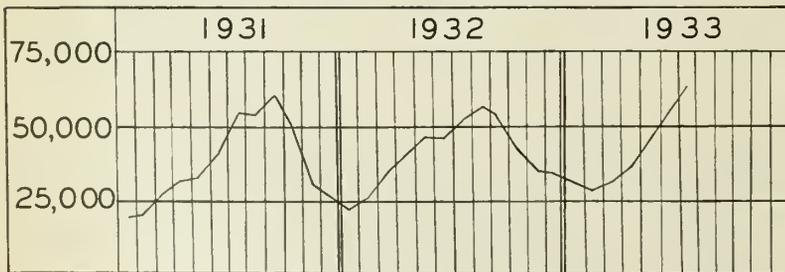
Curtail Air Mail Service

FOUR FEEDER air mail routes were suspended and three discontinued by the Post Office Department as an economy move to aid the Department in meeting the \$4,460,000 air mail appropriation reduction for the current fiscal year.

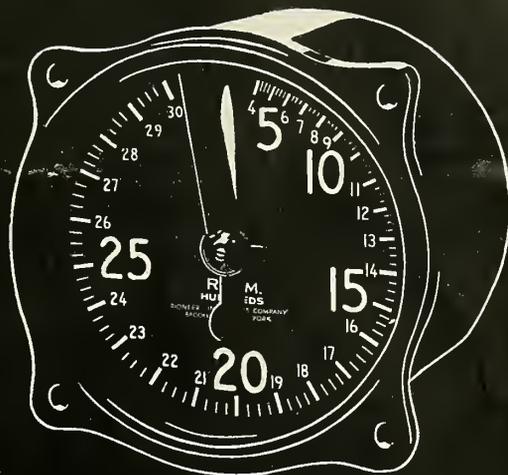
Postmaster General Farley intimated that further economies through a reorganization of the service will shortly be worked out.

Routes suspended until further notice are: New York-Atlantic City, Los Angeles-San Diego, Pueblo-Amarillo and Albuquerque-El Paso.

Routes discontinued are: St. Louis-Kansas City, Kansas City-Wichita and Daytona Beach-St. Petersburg.



AIR EXPRESS (Thousand pounds) AIR MAIL (Hundred thousand pounds)

The new Pioneer Electric Tachometer, Type 639, thoroughly reflects true Pioneer ideals...to evolve new ideas and through concentrated effort to produce honor-built instruments in advance of demand.

After many years of development, in conjunction with the U. S. Navy, this new instrument is presented with several important advantages in addition to those commonly found in this type of engine-speed indicator. Comprising two units...a two-phase alternating current generator and an indicator of the induction disc type, this principle is entirely new in application and definitely eliminates the difficulties experienced with former instruments of this type. There are no brushes or moving contacts of any kind. No shock absorber or special mounting is required for the indicator. The hand, which is remarkably free from vibration, operates over a 350 degree of scale arc, thus providing an open scale not found in any other electric tachometer. Despite extreme conditions, accuracy is assured by Pioneer's method of compensation for temperature variation. Reliability is materially increased and maintenance reduced by the provision for radio shielding and operating the instrument without commutator, slip rings, or moving coils. The new Pioneer Tachometer, Type 639, is offered with the reputation and integrity of Pioneer to back it.

PIONEER INSTRUMENTS

PIONEER INSTRUMENT COMPANY INCORPORATED
BROOKLYN · NEW YORK · A SUBSIDIARY OF THE BENDIX AVIATION CORPORATION

AT THE AIRPORTS

Bendix Field at South Bend Opens

THE NEW municipal airport at South Bend, Ind., was recently dedicated and opened to aerial traffic. The field, named for Vincent Bendix, who financed and sponsored the project, contains 412 acres, three hard-surfaced runways, three hangars, an administration building and is lighted for night operations.

The runways are so located that there is space for extension so that each will be a mile long. At present, one is 3,100 feet and the others 2,500 feet long.

New Service at Washington

EXCLUSIVE PRIVILEGES have been granted to Air Services, Inc., to operate a complete fixed base business at the Washington-Hoover Airport in Washington. John S. Wynne and William E. Payne are at the head of the new organization.

Air Services began work with two Fairchild for training, a Standard and a Stinson.

New Jersey Seashore Airport Opened

SHORE AIRPORT at Brielle, N. J., has been located on State Highway Route 35. Situated about 100 feet above sea level, the airport is reported to be the highest flying field on the New Jersey coast south of Atlantic Highlands. The natural gravel beds on which it is built compose the surface of the airport. The field is operated by Unger Aircraft Corp. under the management of Kenneth R. Unger.

Woman Flier Becomes Airport Secretary

APPOINTMENT of Mrs. Dorothy Pressler, Oklahoma City woman transport pilot, to the post of secretary of the Oklahoma City municipal air terminal has been announced. Mrs. Pressler was recommended by a majority of operators on the field.

Landing Tests Held at Roosevelt Field

LANDING TESTS of various types of civil aircraft were being conducted recently by the Aeronautics Branch of the Department of Commerce at Roosevelt Field, Mineola, L. I., N. Y., for the purpose of ascertaining the distance required by each type for landing.

The Department of Commerce now requires that civil aircraft, in order to be eligible for license, shall not exceed certain specified speeds in landing. Aircraft manufacturers have asked the Department that it be made optional for aircraft to land either in accordance with the speed requirements or within certain distances. As no data were heretofore available relative to the distances needed by the different types of aircraft for landing, it became necessary to conduct the tests.

The information obtained from the tests will be used by the Department in deciding the practicability of making the requested change and also in formulating the new requirement, if it is to be adopted.

ROPER ASKS FUNDS FOR AIRPORTS

STATE OFFICIALS administering Federal money for road construction were called upon by Secretary of Commerce Roper to investigate the feasibility of allotting Federal funds for the construction and improvement of airports and landing field runways.

Secretary Roper pointed out that employment would be increased by such construction and improvements since it would require the services of from 50 to 60 men for a two-month period and would enable the city to take advantage of the newest and speediest means of transportation.

Manager Appointed at Baltimore Port

COL. WILLIAM D. TIPTON has been placed in charge of the operation of the Curtiss-Wright Airport, Baltimore, Md. Colonel Tipton has been associated with the Baltimore Curtiss-Wright air service for several years. The operations of the airport will be carried on under the name of the present operating Curtiss-Wright subsidiary, the Baltimore Air Terminals, Inc. The Thompson Flying Service, which is operated under the direction of Charles Thompson, has exclusive license to conduct commercial flying operations, including flight training, charter and short local flights there.

Wyoming Field Is Planned

THE PROPOSED landing field at Evanston, Wyo., has been approved by three representatives of the Boeing Air Transport Co., and plans were under way recently to level off the site. It is expected that the Department of Commerce will light the field.

Sells Four Planes at Frisco Base

PACIFIC AIRCRAFT Sales Co., San Francisco Bay Airdrome, Alameda, reports the recent sale of 4 airplanes, 2 of which went to Francisca Sarabia, owner and operator of Transportes Aereos De Chiapas, a freight and passenger line operating in Mexico. Sarabia purchased a Ryan and an Aristocrat.

Other purchasers were H. S. Fullerton of San Francisco who bought a Fairchild 22 and J. J. Schmidt, of the same city, who took delivery of a Cessna.

Provide Space for Oil Concessions

THREE MAJOR oil companies will be provided space for buildings at Shushan Airport, now under construction at New Orleans. The first three companies making application will be given permits.

Shell Petroleum has announced that it is ready to build a \$6,000 structure on the field. Land is to be leased to the companies and the board in charge of the field is to receive compensation based on sales.

Await Funds for Biloxi Construction

CONSTRUCTION WORK on the new Coast Guard air base near Biloxi, Miss., is to be started as soon as funds can be obtained from the Public Works Fund, according to Anthony V. Ragusin, secretary of the local Chamber of Commerce who went to Washington to confer on the project.

Springfield Gets Land for Extension

INSTEAD OF purchasing two smaller tracts as had been previously intended for enlarging the Springfield, Mo., municipal airport, the local park board leased 57½ acres to round out the field. The additional space will provide for a northeast-southwest runway of 3,900 feet; a northwest-southeast runway, 3,700 feet long, and a north-south runway, 2,500 feet long.

Turntable Speeds Airport Schedules

INTERLOCKING SCHEDULES of transport lines converging on Port Columbus will create little congestion as the result of the installation of a turntable, designed by Major William F. Centner, superintendent of the field. With one turntable in operation, and three others ordered, four ships will be able to dock simultaneously.

The turntable operates on a circular metal plate, 4½ feet in diameter, which pivots on a ball bearing in a socket. Mounted on the table top is a collapsible plate or chock block, held in place by a collapsible strut.

In approaching the station, the pilot follows a guide line which brings one wheel of his undercarriage onto the table and against the arresting plate. He then guns the opposite outboard motor and the ship pivots 90 degrees to the loading position. After loading, the ship makes another 90 degree turn, when the strut supporting the block plate is released, causing the plane to fall flat onto the table. The ship then moves forward to the take-off runway.

Among other improvements planned for Port Columbus this fall is the construction of a shelter house, reviewing stand and open air pavilion.

(Continued on following page)

INTERNATIONAL AIR RACES AT CHICAGO



RICHFIELD WINS AGAIN!

*A New World's Record and a Clean Sweep of
the Major Events*

- *World's Record for Land Planes (305.33 m. p. h.) set by Jimmy Wedell with Wedell-Williams low wing monoplane.*
- *Phillips Trophy Race won by Jimmy Wedell with Wedell-Williams low wing monoplane.*
- *1000-Cubic Inch Race won by Lee Gelbach with Wedell-Williams low wing monoplane.*

...repeating Richfield's sensational performance at the National Air Races in Los Angeles last July.

FLY WITH THE RICHFIELD BLUE EAGLE



RICHFIELD

RICHFIELD OIL COMPANY ♦ LOS ANGELES ♦ NEW YORK CITY

(Continued from preceding page)

Fire, Gale Wreck Planes, Hangars

LOSSES AMOUNTING to more than \$150,000 were caused by fire and wind storms during the past month. The gale which tore along the east coast of the Atlantic demolished three hangars, destroyed one plane and damaged two others at the Tred Avon Airport in Easton, Md.

Fire destroyed the hangar at Stow Flying Field, Inc., near Dayton, and consumed three planes and a glider while another conflagration swept Air Transport Co., Ltd.'s, plant at Glendale, Calif., destroying five airplanes and the building. The estimated loss of the latter fire was placed at \$120,000.

Continental Appoints Engine Air Service

L. A. HAUF and W. S. Burfoot announce that their company, Engine Air Service, Roosevelt Field, N. Y., has been named representative of Continental Motor Co., and will supply authorized service and parts for these engines. The company, now in its new enlarged quarters in Hangar C, is equipped for major overhauls, the replacing of valve seats and the repair of all types of radial engines.

Plane Brokerage Service Opened

DONALD B. WALLING has leased a shop in Hangar C at Roosevelt Field, Mineola, L. I., N. Y., to house his new and used airplane brokerage service. Used engines also are sold at the shop.

Utah Airport Leases Approved

FOUR LEASES on airport quarters at Salt Lake City, Utah, have been approved by the city commission for the new administration building. Tenants will include the Boeing Air Transport, Inc., which will have a two-year lease on a motor shop and a hangar formerly used by the Postal Service.

Autogiro and Fairchild Sold at Roosevelt

AIRCRAFT SALES CO. reports the sale of a new de luxe Fairchild 22 Sport, powered with a Warner engine, to Bryan D. Sheedy, while Giro Sales and Service, Inc., sold a Kellett autogiro to Herman Schram of New York City. Both organizations are based at Roosevelt Field, N. Y.

Plan New Airport for Portland

AN AIRPORT costing \$681,000 will be built at Portland, Ore., if proposed financing through Federal aid is obtained. A tract covering 160 acres and located near the city has been suggested.

Florida Field Being Prepared to Open

A LANDING FIELD at DeLeon Springs, Fla., will be ready for use this month, according to F. N. Burt, owner of the site. Covering a space 1000

feet by 2500 feet, the field has a standard 100-foot indicating circle and is equipped with regulation boundary cones and wind indicator. A hotel, railroad station, state road and a service station are nearby.

THIRTY NEW PORTS ESTABLISHED

THIRTY NEW airports, an increase of ten over the number established in the corresponding period of 1932, were established in the United States from August 1 to September 10, according to Ewing Y. Mitchell, Assistant Secretary of Commerce.

Urging other cities to follow the lead of those which have recently provided landing facilities, Mr. Mitchell said: "Establishment of additional airports and further development of existing air terminals are essential to further progress in aeronautics, particularly at the present time, when the nation is on the threshold of economic recovery which will undoubtedly result in a marked increase in flying. The 30 cities at which airports recently have been established not only are contributing to the advancement of aeronautics, but also are preparing to gain for themselves many advantages to be derived from air transportation."

Exhibitions Feature Dual Birthday Fete

OBSERVING THE first anniversary of Thompson Flying Service and the third birthday of the Curtiss-Wright Airport, a group of fliers gave a series of aerial exhibitions at the field in Baltimore, Md.

The airport is equipped to render a complete flying service while the Thompson unit has maintained an operating business from the field under the direction of Charles Thompson.

French Island Airport Dedicated

SEVERAL THOUSAND people watched the Flying Aces of Wichita, Kans., dedicate the Pfafflin airport September 3 and 4 on French Island, near La Crosse. The tract, used for several months by La Crosse as a municipal airport during a controversy with the Department of Commerce and Northwest Airways over alleged hazards at Salzer Field, has been improved.

New Flying Service Opens at Marion

MARION FLYING SERVICE, Inc., is now operating at the Marion, Ohio, airport where it is conducting a general repair and overhaul business. The organization was formed with a capital of \$10,000 by Harold W. Cobb, Ada Mae Cobb and George Clyde.

Sports Arena Built at Holmes Airport

HOLMES AIRPORT, Jackson Heights, New York City, embracing an area of approximately 200 acres within sight of Manhattan, has installed several recreational facilities to attract visitors and augment its income. On an area directly adjoining the Goodyear dirigible airship hangar, a race track and sports arena have been completed with seating facilities for several thousand spectators. Directly adjoining the entrance of the sports arena and race track, a beer garden has been laid out and landscaped which, it is reported, will accommodate 3,200 diners at one time.

Renew Bell County Field Lease

THE DEPARTMENT of Commerce will operate an airport in Bell County, Tex., for another year at least, following renewal of a lease with the owners of Roy Sanderford Field, near Bolton. The Department has maintained the field for the past four years, providing lighting facilities all night until recently. Economy measures, however, made it necessary to curtail these facilities for a portion of the night.

Binghamton Airport Group Formed

THE SECOND MEETING of the Boost Aviation Organization was held recently at Binghamton, N. Y. Air meets in Binghamton and aviation activities in connection with the American Legion convention in Binghamton in September were discussed.

The Boost Aviation Organization has been formed principally by individuals connected with the Binghamton, Bennett and Endicott airports.

New Airport for City in Texas

ABOUT 180 acres have been obtained by city officials of Jacksonville, Tex., for a municipal airport. The site is located about two miles north of town and will be improved and furnished with hangars and other facilities.

Air Exhibitions Make Airport Popular

SUNDAY air shows in Salem, Ore., have resulted in large crowds at the airport. Many spectators attracted to the field have become passengers and patrons of the air taxis and sight-seeing planes.

Price, Utah Field Dedicated

THE PRICE airport was officially opened and dedicated September 3 with appropriate ceremonies. A two-hour air circus and talks by prominent flying officials featured the opening.

Dover Field Named for McMahon

FORTY OR MORE planes were expected at the dedicatory ceremonies of the Dover, Delaware, airport which was named in honor of the late Harold E. McMahon.

PRIVATE FLYING

Night Flight Features Air Pageant

A FEATURE of the National Air Pageant being held at Roosevelt Field, Oct. 7 and 8, will be a transcontinental night flight for which a trophy and \$3,000 in prizes have been posted. This flight has been added to the list of events which were described in the August and September issues of AERO DIGEST.

The flight will start from Grand Central Airport, Glendale, Calif., on Oct. 2 and will proceed in two stages over a 2,660-mile course to Roosevelt Field. Derby contestants will follow the TWA route across the country, with the half-way control point at Wichita, Kans. A 14-hour time limit will be placed on both night flights.

Competing ships in the night flight will be handicapped according to their top speeds. Frank Hawks has been appointed chief handicapper. The winner of the event will receive the Night Flight Trophy and \$1,500 in cash.

Judges are John S. Reaves, managing director of the pageant; Casey Jones and T. Park Hay, TWA official.

Public Works Officials Make Air Tour

FIVE HIGH officials of the Public Works Administration took off from Anacostia Air Station for a two weeks' aerial tour of the country. They carried instructions from the Public Works Administrator to State Advisory Boards who were being asked to speed filing of applications. Their itinerary included stops and conferences at New York, Boston, Chicago, Kansas City, Cheyenne, Salt Lake City, Amarillo and Atlanta.

Girl Sets Light Plane Endurance Mark

FLYING A Taylor Cub monoplane, powered by a Continental A-40 engine, Mary Campana of Youngstown, Ohio, recently added one hour and eleven minutes to the world's endurance record for light planes.

Miss Campana remained aloft 12 hours and 28 minutes, coming down when her fuel supply became exhausted.

City Officials on Observation Flight

CITY MANAGER Orville Mosier of Oklahoma City piloted a plane over his municipality recently while Park Superintendent Donald Gordon and City Auditor Francis G. Baker pointed out to him sites of proposed flood control and park development projects. The plane was owned by Hardy Young, who took the controls during part of the flight while Mr. Mosier compared maps with the country below him.

Middle-Aged Man and Girl Fly Solo

A GIRL aged 12 and a man 62 years old were among pilots who flew solo re-

cently, it has been reported. The girl, Lorraine Bowman, whose parents are transport pilots, made her solo flight at Salem, Ore., and the man, J. E. Barnes of Oakland, Calif., received his pilot's license this year.

DATES SET FOR MIAMI AIR RACES

MAYOR SEWELL and the City Commissioners of Miami have decided to hold the Sixth Annual Miami All-American Air Races on Thursday, Friday and Saturday, January 11, 12 and 13. According to Andrew H. Heermance, Director of Aviation for Miami, work on the races is being inaugurated at an earlier date than usual. He believes that in spite of aviation curtailment as compared with boom years, there will be a splendid attendance which may even exceed that at the Fifth Annual Air Races.

Women Fliers Aid NRA Campaign

SIXTEEN WOMEN PILOTS, headed by Elinor Smith, flew in formation over New York City as part of the NRA house-to-house campaign being conducted throughout the country.

The NRA has its own aviation service, headed by Dr. John D. Brock of Kansas City, who was appointed commander-in-chief of the NRA Volunteer Flying Corps. The organization is composed entirely of volunteers who are placing themselves at the disposal of the NRA which utilizes their services to transport speakers to points where they are scheduled to address meetings.

Baltimore Has Annual Air Show

BALTIMORE'S Thirteenth Annual Air Meet, at the Curtiss-Wright Airport, was held under the sponsorship of the Camber Club, formed recently by Baltimore aviators to promote sportsman flying. The program included races, parachute jumping, spot-landing contest and formation flying and bombing by fliers of the Maryland National Guard air unit.

Cups were won by Gail King, Stuart Dietz, Robert Hall, Chet Warrington, Lieut. C. Wheeler, Roy Robbins, Capt. J. Sannon, George Monninger, Lieut. L. H. Dice and Capt. Harold Bohlman. Dr. Hugh H. Young, chairman of the State Aviation Commission, was honorary chairman of the meet; Col. W. D. Tipton was chairman. Dr. H. Schoenrich is president of the Camber Club.

Cup Offered for Washington Pilots

THE WASHINGTON Air Derby Association has announced that it will award a cup to the pilot in the District of Columbia who is credited with contributing the most to the advancement of aeronautics. Achievements for which it may be awarded include betterment of flying conditions, improvement of airplanes or aeronautical engines, saving of life, improvement of methods of instruction, handling airport traffic conditions, or maximum number of flying hours without damage to property or life. A committee of seven members representing the association, the Army, Navy and Marine Corps, the Aviation Committee of the Washington Board of Trade, the Aeronautics Branch of the Department of Commerce and the Washington public will present the trophy annually.

The winner of the cup will be permitted to retain it for one year, when it will be returned, engraved with his name, to be awarded again by the association. He will be allowed to keep permanently a small replica of the trophy.

Radio and Airplane Help Save Life

IN ANSWER to a radio appeal for help, Harry Blunt of Anchorage, Alaska, recently flew through fog and rain with Dr. A. S. Walkowski to an isolated home on Kodiak Island, where four-year-old David Loeff was seriously ill. The pilot flew with the boy and his mother back to Anchorage, where an emergency operation was performed, saving the boy's life.

Mr. Blunt was pilot for Dr. Weston Price, Government dentist, on a recent series of trips over thousands of miles of isolated land in the North.

Three Planes to Go to Antarctic

ADMIRAL BYRD will take three planes to the Antarctic to aid him in his charting, photographic, exploration and scientific work. The largest of the planes is a Condor powered with two Wright Cyclones and equipped with auxiliary gas and oil tanks to assure a 1,800 mile cruising range. Edo Aircraft Corp., of College Point, N. Y., is building a set of floats for this plane, each of them approximately 33 feet long.

The second plane is a Kellett autogiro, also equipped with auxiliary tanks and special instruments. A Boeing B-40 will be taken along as well a new Wright Cyclone for the nose of the Ford which was left in Little America after the last expedition, three years ago. Six bales of cheesecloth provided by the Kendall Co. of Walpole, Mass., will be used exclusively for wiping material on the expedition's planes.



Personalities

• AS THIS IS the first time I've printed the picture of a dog in these columns I should be permitted a few remarks on the peculiar relationship existing between dogs and men. I don't pretend to understand it thoroughly, but it seems to me that the subconscious reason for a man's fondness for a dog is because the man has discovered that his dog is the only living creature that really admires him. Why the dog admires the man is beyond me—I've never managed to figure that out. But I can appreciate that a man naturally would feel grateful for a little admiration and would repay it with affection for the dog, who is a very comforting creature to have around. Many a man with a well developed inferiority complex gains renewed hope when his dog fawns upon him. "I must be better than I fear I am," the poor fellow tells himself—"look how my dog loves me!" If a man could only fool his wife as easily as he can his dog, life would be brighter all around. But he can't, more's the pity.

I recollect my old Uncle Cuthbert, who was much given to Scotch whisky and late hours, remarking that when his dog sniffed at him it was with affection, but when his wife sniffed it was with suspicion. In fact, he regarded a wifely kiss as just so much detective work—too often followed by a sound clout on the ear and the remark, "You're been drinking again, you wretch!" His dog, he observed sadly, treated him more kindly; he sometimes voiced his regret that he had not contented himself with this perfect canine friendship and devotion, instead of cluttering himself up with a wife. Many a man has felt the same way about it, I imagine.

This touching relationship between men and dogs has built up gradually a separate species of human, each specimen complete with dog, who regard all non-dog men with the gravest suspicions. Such doggy specimens of the *genus homo* as Albert Payson Terhune and Frank A. Tichenor look askance at anyone who doesn't love some dog, and feel that he is headed toward a bad end. Dog owners are the ones who made up that utterly untrue saying, which many regard as a truism: "If dogs and children take to a man, he's ALL RIGHT." But if he says petulantly to some dog, "Go away, Bingham! Lie down!" then he's a vicious

by Caldwell

and depraved creature—though probably he merely objects to dog hairs on a blue suit.

The noble looking dog who lends dignity to the photo of pilot H. G. Andrews is Pollo, who has flown enough hours to get a transport license, and is now retired to a farm in northern Ohio. Pollo always liked flying, so when he was asked to join the N. A. A. he merely yawned and walked over to a nearby telephone pole. You can't fool a good dog—he knows. Andy is now raising a pup and says he hopes never to be without a dog. He rather pities me as a member of the non-dog species, forgetting that I have a cat, the most superior animal in the world. A cat, I might add, treats the whole human race with the contempt it deserves; it accepts everything and gives humans nothing but disdain. The cat is the only animal whose sound common sense I admire.

Henry Gay Andrews, the old dog fancier, was born May 21, 1895, at Red



H. G. Andrews and his dog "Pollo"

Bluff, California, and started his aviation career in 1909 with gliders. After completing high school he put in a year and a half on a railroad, but quit before they got around to naming a Pullman car after him. Then he studied law, but learned so little that in 1916 he dashed off to the Mexican border with Troop B of the 1st California Cavalry, who wrote back to the 2nd Cavalry not to come, as it was too hot, and besides, they couldn't catch Pancho Villa anyhow. That was one war we Americans write up very briefly in the school histories.

It's no wonder that Andy Andrews takes to dogs; after wiping off a sweaty horse for a whole year on the Mexican border, looking after a dog is just a vacation. I'm often amazed at the sufferings the old timers went through before they got started in aviation. In fact, if the late lamented Woodrow hadn't decided to hurl the country against the Germans to protect J. P. Morgan's investments with the Allies, Andy might still have been on the Mexican front. Even as it was, he never got far away from Mexico, for he got shoved into the Aviation Section of the Signal Corps and did all his war work in California and Texas.

I've often thought what an unpleasant surprise the Germans would have received if they'd ever attacked Texas. Practically the entire Air Corps was there for the duration of the war, though I understand that a few odd samples were sent to France to furnish literary material for Elliott White Springs in later years. Of course, it was no fault of the boys themselves, but due solely to the cockeyed mess in which American fighting aviation found itself in 1917. The poor thing was the tail end of the Signal Corps; and it's still more or less the tail end of the Army and Navy. It will probably take another war to pry it loose and form it into a fighting force of its own.

Andrews was at Rockwell Field, San Diego, for a while; and then he was sent to Waco, Texas. He was among the first six to arrive at Rich Field, Waco, and came near being among the last six to leave. He instructed there during the war and was still going strong on March 3, 1919, when the Government suddenly remembered that he

was marooned there and sent him a post-card saying that the war was over, and they hoped that he'd enjoyed it. They also hinted delicately that as hostilities were over it was time for him to support himself for a change and give the groaning taxpayers a rest.

Pained, hurt, and grieved at this rough treatment, Andy lit out for California and started the Sacramento Aviation Co., the first organization to barnstorm California after the war. Andy did exhibition flying and flew for the first change from a plane to an automobile at the beginning of the Mad Movie Era. He barnstormed the Rocky Mountains for three years, emulating the efforts of the well-known Rocky Mountain Goat that jumped from precipice to precipice and back to Sacramento, operating from there to San Francisco on the Capital Airlines. He also taught a number of Chinese students to fly, who afterwards returned to China, ostensibly to fight the Nationalist cause. When the Japs appeared in China, not one Chinese aviator could be found. Clever people, these Chinese.

Well, flying around for several years that way, Andy grew more experienced but no richer, which is a practically standard procedure in any profession, although some of us old timers get to thinking that it's a peculiarity of aviation. Doctors and lawyers complain of the same thing. Andy designed and built several planes, all of which flew with some degree of success; he added to the sum total of air knowledge by starting the system of chasing ducks away from rice fields by flying over them. This system was finally perfected by Bert Acosta who used to dive at airports and scare off not only the ducks but any stray pilots and mechanics who happened to be around.

Andrews went to work for Maddux Airlines in 1928, flying their runs until they merged with T. A. T. when he continued on the Pacific Coast flying for T. A. T.-Maddux until March, 1930, when he was transferred to the Eastern Division to fly between Columbus and St. Louis. When this line merged with Western Air to form the present Transcontinental and Western Air, Andy flew the first ship of the new company out of Newark on Oct. 25th, 1930, with the usual load of celebrities and near-celebrities and the first air mail, with the horrible result that he has been signing first flight air mail covers for stamp collectors ever since. So he's now an old reliable airline pilot with plenty of hours, in nearly a hundred different types of planes, with all his barnstorming and stunt-flying years behind him. And like all the other old timers he's probably only about half as happy as he was in the old days when he didn't know where his next meal and his next tank of gas were coming from—and didn't give a damn, either.

• EARLY IN OCTOBER Metro-Goldwyn-Mayer will release the photoplay "Night Flight" from the story by Antoine de Saint Exupery, directed by Clarence Brown, and with a splendid cast which includes John Barrymore, Helen Hayes, Clarke Gable, Lionel Barrymore, Robert Montgomery, and Myrna Loy. The story concerns the French night flying air mail to South America, and according to Reviewer McCarthy of *Motion Picture Herald*, "Is heavily dramatic to the point of being a tragedy, with romance or love interest confined to only one or two sequences. There is little in 'Night Flight' to hold feminine interest."

Which is the reason that, unseen, I strongly recommend "Night Flight" to your viewing. If, like myself, you have



Director Clarence Brown

suffered through miles of film packed with saccharine love, aimed straight at the hearts of the gum-chewers in Woolworth's, you will appreciate a picture which recognizes that romantic love is merely a delightful incident, not necessarily to be dragged by the neck into every film. My movie slogan is "Less love and more action," as the young man remarked when he knocked Senator Huey Long down in the washroom.

Clarence Brown, the director of "Night Flight," is an active pilot and holds a Transport License. He owns and pilots his own plane, a Stearman with a supercharged P. & W. Wasp engine, a very happy combination. Besides using his plane for pleasure trips, he also uses it for business purposes to save time. He often commutes to and from location where he is making exterior scenes for his pictures, and many times uses the ship looking for suitable locations. Also, if he regards distances within Los Angeles as I do, I wouldn't be surprised if he flies from one part of the city to the other; they've got that place so spread out that the only way to get from point to point in a hurry is to fly.

Clarence Brown was born in Clinton, Mass., May 10, 1890, and just to show

you what his parents thought of him, they never repeated the experiment—he's an only child. And probably the only child born in Clinton, Mass., who ever got anywhere, though he had to leave Clinton to do it. At the age of twelve he moved to Knoxville, Tenn., where his father owned and managed cotton mills. After graduating from the Knoxville public schools he entered the University of Tennessee, received a fundamentalist education, and graduated in both Electrical and Mechanical Engineering with a Bachelor's degree which he evidently refused to accept seriously, for he has been married three times, the brave fellow. He was married last Spring to Miss Alice Joyce, and they start even, as this is also Miss Joyce's third marriage. There's nothing like getting off to a fair start in these affairs. Pardon my joking on the subject, Clarence, for I'm a fellow victim—I, too, have been married before and gradually worked up to a divorce. And six months after it, hanged if I didn't lose my Bachelor's degree again! That's what habit does to you.

Well, back in those bachelor days Clarence Brown worked in the engineering department of the Moline Automobile Co. at Moline, Ill., and later for Stevens-Duryea Automobile Co., and still later he owned the Brown Motor Co., selling cars in Birmingham, Ala. In New York he met Maurice Tourneur, then one of the greatest directors making pictures, and decided to enter the business as Mr. Tourneur's assistant. He held that position until the war, when he enlisted in the Army, received his ground school training at Princeton, his flying training at Scott Field. Here he obtained his commission and became a flying instructor, grinding out pupils by the dozen until the armistice came to his relief, when he returned to the motion picture job as assistant to Tourneur. Not long after that he became a director himself. Among his later hits were five Greta Garbo pictures. His most recent successes are "Possessed" and "Letty Lynton" with Joan Crawford, "A Free Soul" with Norma Shearer, "Emma" with Marie Dressler, and "The Son-Daughter" with Helen Hayes.

Brown was the first man in the picture industry to fly a print of his own film from Hollywood to the New York office; on two trips to Europe he rented a plane and flew all over the continent; he has made three transcontinental round trips in his own ship, and hasn't travelled on a train but once in the last six years. That once was on his elopement. There wasn't anything to prevent his getting married right in Los Angeles, but he's been directing romances for so long that he just had to direct his own personal elopement by air to Virginia City. Well, the romantic day and moment arrived; so did a heavy fog. So Brown had to change the script and elope on the prosaic but unfogbound choo-choo train.

THE AIR SERVICES

Converting a Balloon into An Airship

SATISFACTORY TESTS were recently conducted at Scott Field, Belleville, Ill., on a motorized observation balloon for the purpose of determining the practicability of converting an observation balloon into an airship, in order that it may be transported from one observation point to another. The present observation balloon must be towed on a cable when such maneuvers are to be carried out. The craft can be flown as an ordinary observation balloon and then hauled to the ground; the cable disconnected, and a small power car attached, after which it can be operated as an airship. The change from balloon to airship can be made in about ten minutes.

When used as an observation balloon, its operation will be similar to present practice, except that the balloon can be flown to the rear zone and secured to a small mooring mast rather than mooring close to the ground, as was done during the War, which system required special preparations for such a mooring. It can be flown on a cable along seacoast stations for observation purposes and then be converted into an airship for harbor patrol work.

Alabama Guardsmen Seek New Quarters

AN APPLICATION for a loan of \$142,000 from the Federal Government has been made by the 106th Observation Squadron, Alabama National Guard. The money would be used for the establishment of new quarters for the squadron at the Birmingham Municipal Airport.

The city has deeded about twelve acres at the airport to the state for a site, and the Legislature has sanctioned the loan. Roberts Field, the present home of the squadron at Birmingham, is considered too small to accommodate amply the group of planes.

Condemned Parachutes Made Useful

THE 111TH Observation Squadron, Texas National Guard, has received ten parachutes, condemned for human use, to be used in dropping five-gallon milk cans, loaded with supplies, to marooned parties in the marshy coastal sections of Texas, or to carry food, drink and ammunition to them. Every year several parties of hunters are lost in the salt marshes along the Texas coast, and occasionally motorboat parties run out of gas and are stranded on a lonely isle or key.

Improvements at Selfridge Field

NEW CONSTRUCTION at Selfridge Field, Mich., has proceeded with the addition of a main post road of solid concrete. The street lighting system is entirely completed, and the entire waterfront along Lake St. Clair was being

graded recently. A stone walk was to be built along the water's edge, grass sown and trees planted. The new post exchange was about ready for use, as was the officers' mess and the enlisted men's club.

NAVY FLIERS BREAK BALBO RECORD

SIX NAVY Consolidated flying boats of the patrol type broke the non-stop flight in mass formation record held by General Italo Balbo and his squadron, when they completed a 1,788 nautical mile flight in 25 hours, 29 minutes, flying from Norfolk, Va., to Coco Solo, Canal Zone. General Balbo's record was made in 1931 when he led his squadron from Italy to Brazil, a distance of 1,618 miles.

Success of the Navy flight prompted officials in Washington to look forward to a flight from this country to Italy to return the air visit of General Balbo.

The fliers who broke the record were members of VP-5F flight, basing at Norfolk.

TC-13 Active in Air Corps

CONCENTRATION on coastal patrol missions played a prominent part in the recent training of the 19th Airship Company at Langley Field, Va., the TC-13, largest non-rigid type airship in this country, successfully completing a 45 1/3-hour mission.

A total of 2400 aircraft hours was allotted the TC-13 during the current fiscal year. This time will be utilized in making patrols out to sea and along the coast. Most of these patrols will be from forty-five to sixty hours' duration.

Student Fliers Who Make the Grade

IN THE monthly class paper issued by the flying cadets at the Air Corps Training Center, figures showing the percentage of entrants who make good in the flying course are published. These statistics deal only with students entering the Primary Flying School at Randolph Field, Tex., and graduating therefrom to the Advanced Flying School at Kelly Field.

Taking the class which began training at Randolph Field in November, 1931, the figures show that 48.80% of those who started training were transferred to the advanced stage. The percentage of successful students for the class of March, 1932, was 48.47; for the class of July, 1932, 48.67, and for the class of October, 1932, 45.10, or a general average for the four classes of 47.76%.

Army Takes Delivery on Aircruisers

DELIVERY is being made upon a regular schedule of ten Bellanca Aircruisers ordered by the Army for special use in connection with Army transport operations. These ships will be stationed at various points throughout the country and will be used for transporting materials and supplies between the various Army depots and to operations in the field which in many cases will be at a remote distance from any other system of transportation. Each of these ships follows Bellanca Aircruiser design and construction; cabin and seating arrangements are built to answer the special use to which the Army intends to put them. They are designed for heavy transport duty of men, materials or supplies and are fitted with litters for the transportation of wounded or sick.

The planes, powered by Pratt & Whitney geared Hornet 650-horsepower engines, are capable of cruising at 141 miles per hour and have top speeds of approximately 161 miles per hour.

Guardsmen Increase Flying Time

DURING the annual maneuvers of the Pennsylvania National Guard this year, members of the 103rd Observation Squadron, 28th Aviation Division spent a total of 348 hours in the air, a gain of 132 hours over the time flown by the unit in the same period last year. Maj. Victor Dallin is the commanding officer of the squadron, which is based at the Philadelphia Airport.

Two More Hangars at Luke Field

CONSTRUCTION of two additional hangars at Luke Field, Hawaii, was recently started. This project, involving a contract totalling \$37,500, included the dismantling of three hangars formerly used by the 18th Pursuit Group at Wheeler Field and the erection of two of them into complete units at Luke Field. The material of the third dismantled hangar will be used in the construction of lean-to additions to the present hangars of the 5th Composite Group. The two bombardment squadrons of Luke Field, the 23rd and the 72nd, will share the storage space in the two new hangars.

Hawaiian School Graduates Mechanics

LUKE FIELD, Hawaii, graduated a class of ninety-two enlisted men, now qualified engine mechanics, from the post school recently. This is one of the largest classes to be graduated from the Luke Field Post Schools, the courses of which include airplane engines, armament, carburetion, ignition, stenography and primary education. Sgt. L. D. Miller is chief clerk for the schools, and Technical Sergeant Randles was instructor for the engine class.

KEEPING PACE WITH THE NEEDS OF THE NAVY



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AVIATION ENGINEERING

TECHNICAL EDITORS: GLENN D. ANGLE • PROF. ALEXANDER KLEMIN • DR. MAX MUNK • DR. MICHAEL WATTER

Computation of Longitudinal Stability

DR. MAX M. MUNK

• An airplane apparently moving uniformly in steady equilibrium through the air, actually is constantly deviating slightly from a straight path. Each variation of the wind, or other disturbance, shifts the center of gravity and causes the airplane to rotate in different directions about its center of gravity.

If the airplane automatically resumes its original uniform motion after the small disturbance causing the deviation therefrom has ceased, the flight motion is said to be stable. Study of stability requires an investigation of all possible motion components. The airplane is called dynamically stable if it is stable with respect to all its possible motions. Dynamic stability therefore does not mean a special kind of stability. The term "dynamic" distinguishes this actual or true stability from a mere fictitious stability. Stability under certain conditions, called "static" stability has no physical existence. With pressure, static pressure actually exists, and dynamic pressure is a computed quantity. The opposite is true for stability, the dynamic stability is the actual one, and the static stability an unreal substitute.

Static Stability

The computation of actual stability is laborious and too difficult for most practical purposes, and is therefore seldom performed by designers. For reasons of expediency, computation is confined to investigating static stability, even though the latter has no full physical existence.

Static stability refers to entirely unreal conditions. It is assumed that the center of gravity of the airplane is forced along an invisible path and with constant velocity, and also that the wing tips are prevented from rolling. There remain, then, two angular motions which are still free and which depend upon the nature of the aerodynamic forces—these are the yawing rotation about the vertical axis, and the pitching rotation about an axis parallel to the span, both axes passing through the center of gravity of the airplane. Static stability means stability of an airplane flying under such conditions which are indeed quite foreign to actual conditions. The airplane

in flight is capable of altering all six variables of its motion, including variations in the magnitude of the velocity. The resulting motion is difficult to compute, because all six components of the motion mutually affect one another. For instance, with the angle of attack slightly increased a pitching moment is produced that may tend to bring the angle of attack back to its original magnitude, by rotating the airplane. Excess lift is then also produced, giving rise to an upward motion. Once such an upward motion is created, it again changes (by its mere existence) the angle of attack relative to the air motion, so that the angle of attack is no longer equal to the inclination of the airplane.

Computing Components and Forces

Variation of the velocity of flight produces lift forces and moments, in addition to a variation of the drag, which alone corrects the velocity and tends to restore it to its original value. In short, the different components of the motion, and the air forces resulting therefrom, cannot be computed separately, but must be dealt with together, which of course makes the computation difficult.

With the motion under the assumed static conditions there are only two components, and they can be treated independently. Accordingly, we have a lateral static stability, referring to yawing about the vertical axis (or weather vane stability) and longitudinal static stability, which relates to pitching about the transverse axis. The latter is treated more fully and more frequently in literature, and if static stability only is mentioned, longitudinal static stability is generally implied.

The computation of this static stability is comparatively easy, because only one component of motion, the angle of attack, occurs. The principles of wing section theory, and of wing theory, (discussed previously by the author in AERO DIGEST), suggest a simple way of computing the magnitude of the pitching moment created by a variation of the angle of attack. Methods given in several text books for accomplishing

the same end are more laborious than the following method without being inherently different or better.

We propose to compute the restoring pitching moment by determining the aerodynamic center of the airplane. The computation takes into account only the angles of attack below the burbling point. The aerodynamic center is the center of pressure of the air forces brought into play by a variation of the angle of attack. The position of the aerodynamic center depends upon the distribution and arrangement of different wing and tail surfaces only, not upon their angles of attack or their wing sections. The aerodynamic center is computed as the center of gravity of these areas, each presumed to be concentrated at 25% of their average chord, and each area being multiplied by its factor of lift production. This factor is the ratio of the actual lift to the lift which would have been created in two-dimensional flow. It expresses the effect of the induced downwash. Since the wings are affected by their own downwash, and the tail surface is subjected to its own downwash and also to the downwash created by the wings, the lift production factor of the tail surface consists of two terms, one for the wing interference and the other for the self interference of the tail surface. The wing factor has this latter term only.

The lift production factor of the wings is

$$\frac{1}{(1 + 1.82/\text{wing aspect ratio})}$$

The lift production factor of the tail surfaces is

$$\frac{1}{(1 + 3.3/\text{wing aspect ratio}) \times (1 + 1.8/\text{tail aspect ratio})}$$

The common center of gravity of the wing and tail areas modified by these factors is, of course, located between their individual centers of gravity, supposed to be at 25% of the average chord. The tail surface therefore moves the aerodynamic center back from the 25% position of the wing alone. In practice it may be at 35% of the wing chord.

Knowledge of this aerodynamic center and of the position of the center of

gravity is sufficient for obtaining a criterion for the static stability of the airplane, and for computing its magnitude. If the center of gravity coincides with the aerodynamic center, the airplane is statically indifferent. The air forces created by a variation of the angle of attack would then pass through the center of gravity of the airplane, and no air moments would be created with respect to the center of gravity. Hence there would neither be a tendency to increase the angular displacement nor would the angle of attack be restored to its original value, if accidentally changed. Theory indicates that such static indifference always gives dynamic or true stability, and hence such indifference would seem to be sufficient for the design. Experience has shown, however, that it is advisable for the airplane to possess a small positive stability. This requires that the aerodynamic center be aft of the center of gravity, for the air forces are then of a restoring character. An increased angle of attack produces an upward force. This lift further increases the angle of attack if attacking in front of the center of gravity, but if acting behind the center of gravity it diminishes the angle and restores it eventually to its original value. In keeping with a fundamental law of mechanics, the airplane acts as if suspended at the center of gravity, as far as its rotational motions are concerned. The rule, therefore, is to locate the center of gravity forward of the aerodynamic center.

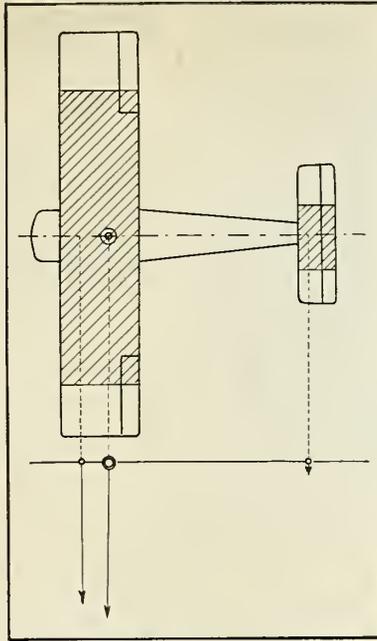
Magnitude of Restoring Moment

There remains the question of "How far forward?" How great should be the distance between the center of gravity and the aerodynamic center? An exact figure cannot be given to this question, as the correct distance is probably different with each airplane type. With new designs, an analysis of average distances found with successful airplanes would, however, be a valuable guide for a decision on the subject. No literature exists on the subject of the distance between the center of gravity and the aerodynamic center, because this method of treating the subject is new. There is, however, information available on the magnitude of the desirable restoring moment. W. S. Diehl analysed a number of airplanes with respect to this moment, and as result recommends the slope of the restoring moment curve plotted against the angle of attack in degree to be

$$(\text{moment slope}) = k (\text{dyn. pressure}) \times (\text{area}) \times (\text{chord}) \times (\text{wing loading})$$

where k denotes Diehl's constant, a modulus of a dimension inverse to a pressure.

The following relation containing the



Determination of the aerodynamic center of a monoplane

distance between the center of gravity and the aerodynamic center follows directly from the definition of the aerodynamic center:

$$(\text{moment}) = \frac{0.1 (\text{angle}) \times (\text{center distance}) \times (\text{area}) \times (\text{dyn. pressure})}{(1 + 1.82/\text{aspect ratio})}$$

In other words, this moment is equal to the product of lift by lever arm, and the lift again is equal to the product of lift production factor and lift in a two-dimensional flow. The latter at last is equal to the product of the area, the dynamic pressure and the lift coefficient, which coefficient is 1/10 of the absolute angle in degrees.

Combining this equation with Diehl's recommendation, expressed in the previous equation, with the intention of obtaining a relation between our center distance and Diehl's constant k, we obtain,

$$(\text{center distance})/(\text{chord}) = 10 k (\text{wing loading}) \times (1 + 1.82/\text{aspect ratio})$$

Diehl recommends .0005 to .001 for k, if the wing loading is given in pounds per square foot, so that k is given in that form. Hence

$$(\text{center distance})/(\text{chord}) = (.005 \text{ to } .01) \times (\text{wing loading}) \times (1 + 1.82/\text{aspect ratio})$$

The last bracket is generally near 1.3. For a wing loading of 10 pounds per square foot, we would then obtain 6.5 to 13% distance between the center of gravity and the aerodynamic center.

The question of how far apart the cen-

ter of gravity and the aerodynamic center should actually be, and how far this distance may be permitted to vary for different conditions of loading is far from settled. It is a matter of opinion and taste. The importance of the computation method discussed here lies in the possibility of more easily analysing by means of it than by older methods the longitudinal static stability of proven airplanes, and to ensure progress in the development by choosing the distance consistently and in keeping with definite rules, either with one based on Diehl's analysis, or some other, rather than leaving the distance between the two centers to chance.

Correcting for Stability

The discussion further distinctly brings out the fact that the stability cannot be corrected by a change of the stabilizer setting. Variations in the angle of attack of the horizontal tail surface are available for securing equilibrium, that is, for placing the center of pressure correctly at the center of gravity for average flying conditions. Curving the stabilizer has the same basic effect as changing its angle of attack, and is recommended only if during most of the flying the stabilizer creates lift in one direction, which should then be the convex side of the stabilizer section. If the stabilizer is called upon to deliver air forces unsymmetrically, (chiefly up or down) an unsymmetrical shape will answer best, and cause less drag than a symmetrical shape. For the conventional design the stabilizer air forces are about symmetrical, and in that case a symmetrical shape is desirable.

The limitation of the method to the region below the burbling point of the wing and the stabilizer must be kept in mind. Stabilizer area and angle are independent, but the equilibrium must never require excessive angle of attack of the stabilizer, leading to burbling and loss of equilibrium and stability. A certain stabilizer area is further required by the condition of sufficient controllability.

Inadequacy of Computations

The reader may feel that the computation method discussed here is inadequate for the problem, and it is indeed, yet there is little more (and often less) used in practice. For most of these questions the designer is left to his artistic taste, intuition, imitation, and even to a fair portion of good luck. Fortunately, after the airplane is tried out in flight, most flight characteristics found inadequate or excessive can be corrected by easy changes of dimensions, and in this manner an airplane with good flight characteristics may finally be evolved.

Airplane Wheel Drag

B. V. KORVIN-KROUKOVSKY

Chief Engineer, Edo Aircraft Corporation

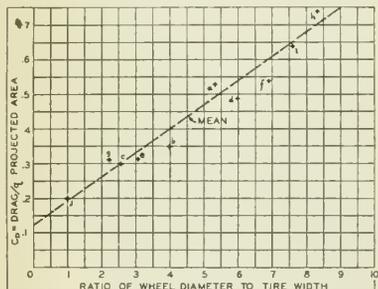
• A brief examination of data on wheel drag was made in view of consolidating the information for low, medium and high-pressure wheels of varying sizes. It was found that drag coefficients of wheels depend on the ratio of the outside diameter of the tire to its width and can be predicted with accuracy from the linear relation

$$C_D = .12 + .69 D/b$$

where

D is the outside diameter of the tire
b is the width of the tire.

The curve of C_D versus D/b , and the data on which it is based, is reproduced herewith. It is interesting to note that the resistance of wheels expressed as above is in line with resistance C_D , defined as Drag / $q \times$ projected area of spheres with interference of a projection on the side, corresponding to the wheel axle.



Curve showing C_D versus D/b

It is important to note that the resistance of wheels given above includes the interference between the wheel and other parts of the undercarriage, as in most cases the resistance of wheels was determined as the difference in resistance of the landing gear with and without wheels.

Wind tunnel and other references on the subject are as follows:

(a) Diehl, "Engineering Aerodynamics,"

Resistance of Wheels, p. 89 (wheel probably including interference with other parts):

$$32 \times 6 \text{ at } 100 \text{ miles per hour,} = 16 \text{ pounds}$$

$$\frac{6 \times 24 + 6^2 \pi}{4}$$

$$\text{Area} = \frac{144}{144} = 1.18 \text{ square feet.}$$

$$q_{100} = 25.6$$

$$D_C = 16/1.18 \times 25.6 = .53$$

$$\text{Ratio of diameter to tire width} = 5.33$$

(b) R. J. LeBer, *Aviation Engineering*, February, 1931:

40 × 40 wheel (without fairs) at 40 miles per hour = 3.685 pounds.

$$\frac{30 \times 10 + 10^2 \pi}{4}$$

$$\text{Area} = \frac{144}{144} = 2.6 \text{ square feet.}$$

$$q_{40} = 4.1$$

$$D_C = 3.685/2.6 \times 4.1 = .53$$

$$\text{Ratio of diameter to tire width} = 4.$$

C. H. Martens, *Aviation Engineering*, October, 1930, tests on five wheels at New York University:

wheel size	Ratio of diam. to width(*)	$D_C \times 10(f)$	$C_D \times 10(f)$	drag / qA
(c) 9.00 — 6	2.56	7.70	.300	
(d) 30 × 5	6.00	12.40	.490	
(e) 7.50 — 10	3.06	8.05	.315	
(f) 28 × 4	6.92	13.80	.540	
(g) 22 × 10 — 4	2.22	7.92	.310	

(*) Actually measured and does not correspond exactly to nominal dimensions.

(f) Includes interference between the wheel and the shock-absorbing strut parallel to it.

(h) N.A.C.A. T.N. No. 169, figure 3, Siemens-Schuckert D1 landing gear:

Frontal area of two wheels = 1.3 square feet.

Ratio of diameter to tire width, 710/85 = 8.35

Equivalent flat plate area at highest q tested = .75 square feet for two wheels.

$$C_D = .75 \times 1.28/1.3 = .74$$

(i) N.A.C.A. T.N. No. 169, figure 6, Luftfahrsgesellschaft:

Frontal area of two wheels = 1.6 square feet.

Ratio of diameter to tire width, 760/100 = 7.6

Equivalent flat plate area at highest q tested = .8 square feet for two wheels.

$$C_D = .8 \times 1.28/1.6 = .64$$

(j) N.A.C.A. T.M. No. 475, figure 5, gives the resistance coefficient of a sphere at $R.N. > 3.5$ of about .2 when there is the interference on the side tangential to wind direction, similar to the wheel axle.

Recent Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N. W., Washington, D. C.

Variable-pitch propeller. Max M. Munk, Washington, D. C. (1,914,754)

Monospar airplane. Carl de Ganahl, Greenlawn, N. Y., assignor to Fleetwings, Inc., Garden City, N. Y. (1,919,620.)

Propelling mechanism for airplanes. Giuseppe M. Bellanca. (1,919,682.)

Stabilizing device for aircraft. Charles R. A. M. de Rouge, Vouysses Par Mercues, France. (1,919,831.)

Propeller pitch regulator. Jess W. Bace, Taft, Calif. (1,919,875.)

Propeller. Raymond P. Lansing, Montclair, N. J., assignor to Eclipse Aviation Corp. (1,920,086.)

Gyroscopic compass. Arthur E. Brewerton, Perley, England, assignor to Sperry Gyroscope Co. (1,920,241.)

Practice bomb. Herman E. Halland, U. S. Navy. (1,920,257.)

Airplane construction. Halbert H. Holloway, Los Angeles, Calif. (1,920,507.)

Variable-pitch propeller. Marius J. P. Baptiste, Neuilly-sur-Seine, France. (1,920,674.)

Method of making propeller blades. Hamilton N. Wylie, Whitley, England, assignor to Sir W. G. Armstrong Whitworth Aircraft Ltd. (1,920,830.)

Apparatus for adjusting aircraft for a predetermined course. Antonio Clementi, Vienna, Austria. (1,920,959)

Airplane. William A. Roth, St. Paul Minn. (1,921,043)

Airplane. Harold A. Hicks, Detroit, Mich., assignor to Ford Motor Co. (1,921,294)

Aircraft structure. George H. Pegram, South Orange, N. J. (1,921,428)

Airplane. Maurice Quemin, Le Mans, France. (1,921,636)

Helicopter. Ferdinando Bordoni, Rome, Italy. (1,921,805)

Aircraft having freely rotative sustaining wings. Arthur H. C. A. Rawson, London, England, assignor to Autogiro Co. (1,921,839)

Propelling device. John G. Steele, Latrobe, Pa. (1,921,893)

Screw propeller (variable pitch). Pierre Levasseur, Paris, France. (1,921,931)

Metallic propeller (variable pitch). Paulin J. P. Ratier, Montrouge, France. (1,921,942)

Follow-up device for gyro compasses. Bruno A. Wittkuhns, Chatham, N. J., assignor to Sperry Gyroscope Co. (1,921,983)

Aircraft. Grover Loening, Mill Neck, N. Y., assignor to Grover Loening Aircraft Co. (1,921,992)

Monocoque body. Stanley I. Vaughn. Kenmore, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,922,063)

Aircraft. James H. Crossman, 3d, Wilmington, N. C. (1,922,124)

Helicopter and airplane. Joseph J. Leray, West Warwick, R. I. (1,922,167)

Airplane propeller (hollow metal). John Squires, Detroit, Mich. (1,922,179)

Airplane wing structure and method of making. Victor Lougheed, Washington, D. C. (1,922,311)

Aircraft. Russell G. Jones, Jackson Heights, N. Y. (1,922,371)

Developments in high-powered Aircraft Engines

(Part 1)

●

GLENN D. ANGLE

• An occasional survey of progress made in any line of engineering endeavor invariably proves to be of real benefit in plotting a logical course for the future. One should profit greatly from a properly evaluated compilation of important facts or figures, because it generally enables the avoidance of certain matters pertaining to the art which may be classed as errors, or those which have not turned out as well as originally anticipated. Moreover, the relative values of the improvements that have been effected, or the new ideas which have been advanced, may be more readily judged in the light of their true importance from an analytical examination of this sort. Also, if the actual design trends are not immediately apparent, a careful study should at least suggest a promising course to follow when planning future developments.

The foregoing remarks are applicable to most branches of engineering where progress has been rapid, and they consequently should be especially fitting when referring to any phase of aircraft engine development. Since it is a commonly accepted fact that engines of large output have a definitely useful field in aircraft, it seems appropriate at this time to survey the progress that has been made thus far in designs of this class.

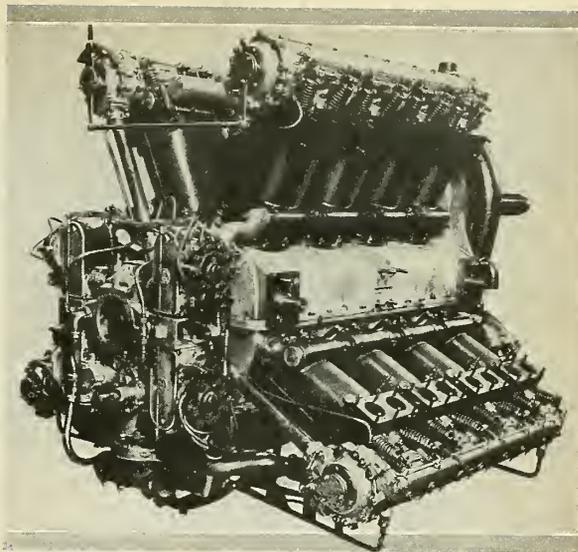
Before entering into a discussion of the modern engines in this category, let us briefly review the history of the development of large power plants. We find that only thirteen designs with an output of 600 or more horsepower had been built up to 1924. Seven of these originated in France, three in Great Britain, one in Italy, and two in America.

The French designs were for the most part experimental. Peugeot and Renault each built twelve-cylinder V types devel-

oping 600 h.p. at approximately 1600 r.p.m. An exceptionally large eight-cylinder V type was built experimentally by LeMaitre and Gerard; this engine was rated 700 h.p. at 1600 r.p.m. and was never fully developed. The twenty-cylinder radial engine built by Anzani, that was rated 650 h.p. at 1700 r.p.m., possessed many interesting features; but it did not become a standard service type. Neither did the unconventional sixteen-cylinder double V design of Panhard and Levassor which was rated 700 h.p. at 1700 r.p.m. This engine had four rows of four cylinders spaced 45° apart. Apparently the only engine of this group developed to a point that it could be put into flying service was the Farman eighteen-cylinder W type rated 600 h.p. at 1800 r.p.m. Compared with the others, it was heavy for its displacement and output, and perhaps it was due to the sturdy construction of this engine that it attained a greater degree of success.

None of the six French designs to which we have just referred normally developed over 700 h.p., and of these only one seems to have passed the experimental stage. French engine manufacturers were still considerably short of the 1000 h.p. goal nine years ago. However, the fact that Lorraine-Dietrich had proposed a twenty-four-cylinder W type—composed of three rows of eight cylinders each—which had this rated output, is proof that their efforts were bent in this direction. A wooden model of the latter design was exhibited at one of the aeronautical shows in Paris. It has been reported that an actual engine was never constructed, but even if this report was in error, we know that the design was never developed for service use.

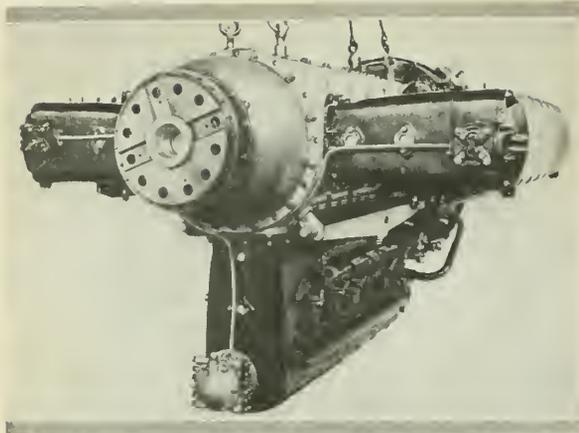
The three largest British engines of that



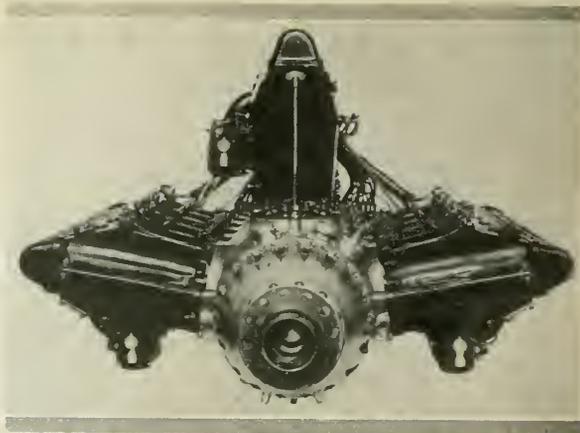
First 1000 h.p. engine, the 16-cylinder Napier "Cub"

period had been developed to a more advanced stage. The first of these to make its appearance was the "Condor," built by Rolls-Royce. This was a twelve-cylinder V type, with propeller reduction gears, which had a rated output of 650 h.p. at 1900 r.p.m. The refinement of this model was continued for a number of years, and during recent months it has been converted into a Diesel type. Another British aircraft engine, having the largest piston displacement of any proposed up to that time, was produced shortly after the "Condor" made its appearance. This was designed by Sunbeam primarily for the lighter-than-air type of craft, and it was known as The "Sihk." It had twelve cylinders in V arrangement and developed 850 h.p. at 1400 r.p.m., the reduction gears providing a propeller speed of 920 r.p.m. Undoubtedly the engine creating the most interest at that time was the Napier "Cub." This was not only for the reason that it was the first aircraft engine constructed to actually deliver 1000 h.p., which it was claimed to do at the normal speed of 1900 r.p.m., but because of the unconventional arrangement of its sixteen cylinders, which comprised four rows of four each in the form of an irregular X. To the British engineers, therefore, goes the credit for having developed the first aircraft engine of 1000 h.p. that could be put into service.

The most significant feature concerning the Fiat A-14 engine, the single Italian design of high output of the period to which we refer, was the fact that it was produced in larger numbers than any of the others in its power class. This engine had twelve cylinders in V arrangement, and it was rated 650 h.p. at 1550 r.p.m. While not especially



Farman Model 18T rated at 1200 h.p.



1000-horsepower Hispano-Suiza Model 18Sb

noteworthy in comparison with some of the other designs as regards weight per horsepower, the Fiat A-14 engine was evidently fairly reliable according to the design standards of that time, else it would have not been so widely used.

During the war, a sixteen-cylinder V type engine, having a rated output of 800 h.p. at 1800 r.p.m., was designed and built experimentally by Duesenberg. This engine failed to meet expectations, and as a result no engine with an output over 500 h.p. was being built in the United States until the Army Air Service undertook the W-1-A engine development, that was carried out under the author's supervision. This engine had eighteen cylinders in W form and developed over 800 h.p. at 1800 r.p.m. The project marked two important steps in aviation engine development—it was the first eighteen-cylinder W type aircraft engine constructed in this country—and it was the first American aviation engine, delivering as much as 800 h.p., to successfully pass its endurance tests. Owing to limitations laid down by specifications considered essential at that time, together with the fact that no suitable airplanes capable of being powered by such a large engine were available, only a few units were constructed and tested in flight. However, the influence of the project was reflected in several engines developed at a later date.

In summarizing the status of high-powered aircraft engine development nine years ago, we must acknowledge British leadership with their three designs beyond the highly experimental stage, and one of these producing 1000-horsepower. The design progress in the United States was actually not far behind, because in the development of this one high-powered unit, it was definitely determined—had it been possible to carry out the proposed modifications—that along with improved reliability, the output could be increased

and the weight reduced so that the weight per horsepower would represent a lower figure than had yet been attained. In passing it should be mentioned that another eighteen-cylinder design to produce 1000 h.p. at 1400 r.p.m. was partly constructed, but after a series of delays, and finally a lack of appropriated funds, it became both advisable and necessary to abandon the project.

Even though the single Italian design in the high-powered class at that time normally developed only 650 h.p., it deserves a high rating because of the number of units produced. France, on the other hand, had more high-powered engine projects under way than all other countries combined, and yet not one of these designs showed up especially well in comparison to the rest of the big engines of that period.

It would be difficult to clearly picture the progress in high-powered aircraft engine design if the foregoing comments were not included. Space will not permit as much consideration of the many engines in the same horsepower class that made their appearance during the following years. However, for sake of continuity we will mention the prominent ones while taking up the most important part of this discussion; namely, the modern designs with an output of 1000 or more horsepower. For lack of a better means of classification, we shall deal with these engines according to the country in which they originated, and as before, the French designs will be treated first.

French Engines

Renault continued the development of twelve-cylinder V types, about four years ago bringing out their 12MC model rated 750 h.p. at 1800 r.p.m., and its geared companion, the 12MD rated 850 h.p. at 2100 r.p.m. Recently this company announced a larger geared and supercharged model of the same type which

it is said will develop from 1500 to 2000 h.p. However, this engine is still highly experimental, and few facts concerning its performance are available. Should it deliver the output anticipated, it will become the most powerful twelve-cylinder V type ever constructed.

Lorraine-Dietrich, which is now controlled by the Société Général Aéronautique, constructed several engines ranging from 600 to 1000 h.p. The earlier eighteen-cylinder W types, model 18Ka, and its geared companion the 18Kd, both developed 650 h.p. at 1800 r.p.m. The "Courlis," a twelve-cylinder W type, was normally rated 600 h.p. at 2000 r.p.m. The "Petrel," whose twelve cylinders were in V arrangement, had a maximum output of 675 h.p. at 2200 r.p.m.; and a larger engine of the same type, known as the "Eider," normally gave 900 h.p. at 2200 r.p.m., and was reported to deliver 1050 h.p. at this speed. The more recent eighteen-cylinder W type, which is known as the "Orion," has a normal rated output of 700 h.p. at 2000 r.p.m., and it is claimed that it gives a maximum of 840 h.p.

Hispano-Suiza, whose efforts were mostly confined for quite a time with eight-cylinder V type engines, entered the higher horsepower field with their 12Nb, and its geared companion the 12Nbr, both twelve-cylinder engines in V form having a rated output of 760 h.p. at 2100 r.p.m. The Model 18Sb, an eighteen-cylinder W type employing the same cylinders as the 12Nb models, created a great deal of interest when it made its appearance a little over two years ago. This engine was apparently built primarily for racing purposes, having a rated output of 1650 h.p. at 2400 r.p.m., but the stock model since offered to the trade carries a rating of 1000 h.p. at 2000 r.p.m., and is said to deliver 1125 h.p. at this speed. The three rows of six cylinders are placed 80° apart.

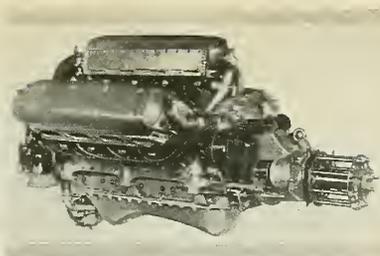
This type of engine was originated by the author just ten years ago.

An engine similar to the Hispano-Suiza, but arranged for mounting in an inverted position, is the rather recent design of Farman. This engine, known as the model 18T, is normally rated 1200 h.p. at 3400 r.p.m., and gives a maximum output of 1480 h.p. at 3700 r.p.m. The propeller is driven through reduction gears, and a supercharger is fitted. Even firing is dispensed with, without seriously affecting the torque characteristics, by placing the outer rows at 90° instead of 80° from the center vertical row of cylinders. While it still must be classed as a particular W type engine, its arrangement and position forms a letter T.

Gnome and Rhone, a consolidation of two old and well-known French firms, build air-cooled radial engines mostly under Bristol license. A two-row fourteen-cylinder design, which this company developed, has a normal output of 700 h.p., and a maximum output of 800 h.p. at 2030 r.p.m.

About five years ago, Breguet constructed two unusual engines based on a type originated by Bugatti. The one known as the Quadrimoteur Type B had thirty-two cylinders, and was estimated to develop 950 h.p. at 2100 r.p.m. This engine employed double crankshafts, with one row of eight cylinders operating above and another below each one. The construction was formed about a common crankcase, the two crankshafts being geared to a single propeller shaft. The Type A, which was rated 1000 h.p., was formed by placing end to end, one behind the other, two engines having two parallel rows of eight cylinders operating about separate crankshafts. It appears that these designs are now obsolete, but regardless of the degree of their success, they are interesting because of the unique arrangement.

From a review of the progress in France during the past nine years, we find that six manufacturers have been

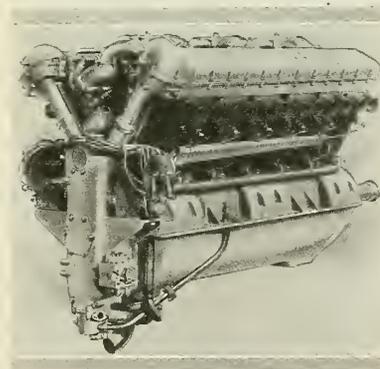


British Napier Lion racing engine

active in developing engines of large output; five of these have built engines of 1000 or more horsepower, and at least four are still engaged in this field. The aircraft engine manufacturers of France as a whole have risen from no more than fourth position to among the leaders producing high-powered units. Perhaps the most significant feature in their progress is the actual construction and development of the open-W types by Hispano-Suiza and Farman, which are not only ideally suited for large units from an engineering standpoint, but are especially adaptable for airplane installation.

British Engines

In Great Britain the development of large power plants has been continued.



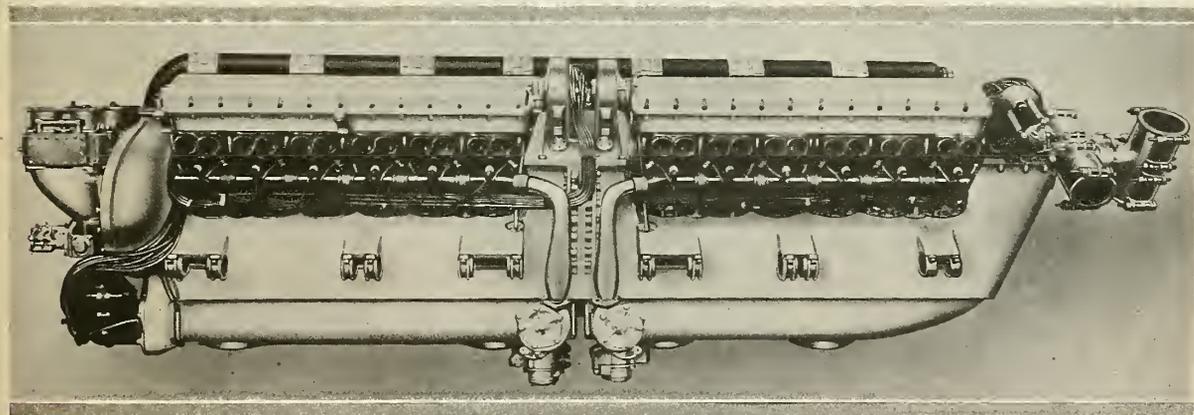
The 1000 h.p. Fiat A-S-3

The program of Rolls-Royce with the "Condor" has already been referred to, but of more interest is the development of the H and R types. These are twelve-cylinder V engines, designed, it would appear, primarily for racing airplanes. The model H, or "Buzzard," gives 825 h.p. at 2000 r.p.m., and the R, which is claimed to be lighter and deliver more power, was used in the ship winning the Schnieder Trophy Race of 1929.

D. Napier & Sons, Ltd, it seems abandoned the development of the 1000-h.p. "Cub," but this firm stepped up the performance of the "Lion," their well-known twelve-cylinder W type engine, until the "Lion" VII A and its geared companion the VII B, delivered 875 h.p. at 3300 r.p.m. The latter engine powered the ship winning the Schneider Trophy Race of 1927. Sunbeam proceeded with the development of the twelve-cylinder "Sihk," and the type III was reported to deliver 1000 h.p. at 1650 r.p.m.

Besides the three firms that pioneered large engine development in Great Britain, we find that Beardmore constructed in-line types principally for lighter-than-air installation. The six-cylinder "Cyclone" was rated from 850 to 950 h.p., and the "Typhoon," an inverted edition of this design, was normally rated at 925 h.p. The "Simoon," an eight-cylinder inverted design, was rated 1100 h.p. at 1250 r.p.m. Beardmore has apparently abandoned these designs for similar types to operate on heavy fuels. Bristol has shown outputs exceeding 600 h.p. with some of their well-known nine-cylinder air-cooled radials, and the Armstrong-Siddeley "Leopard," a fourteen-cylinder air-cooled radial, was built for direct drive with a rated output of 700 h.p. at 1500 r.p.m., and for geared drive with a rated output of 800 h.p. at 1700 r.p.m.

Thus we find British engine manufacturers constantly improving the performance of their products without seriously attempting to build units of greater displacement. Although designers in other



The most powerful aircraft engine, the Italian Fiat A-S-6 rated 2800 h.p. at 3200 r.p.m.

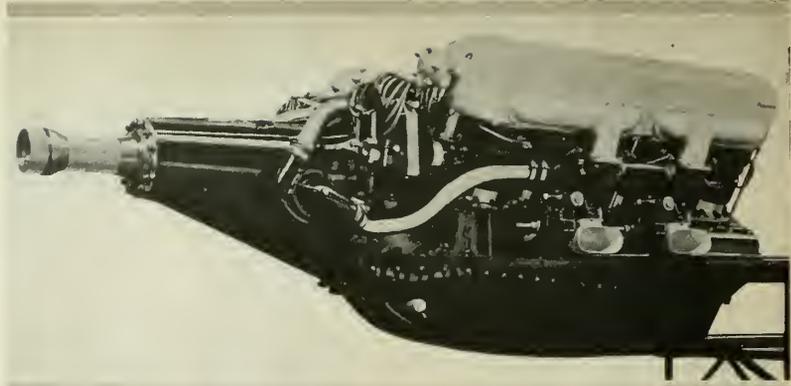
countries have created power units of greater size, it certainly cannot be said that British engineers have not kept pace. Everyone appreciates that increased reliability, and improvements in power output for a given piston displacement or weight, are far more important than mere size.

Italian Engines

If we could in all fairness rate the several countries both as to the size and performance of their large aircraft engines, we would assuredly give Italy the leading position. Fiat, the one Italian firm that pioneered large engines, began a new series of twelve-cylinder V types during 1925. The A-24, which is built for either direct or reduction gear drive for the propeller, is rated 700 h.p. at 2000 r.p.m. A larger engine, the A-25, is normally rated 950 h.p. at 1700 r.p.m. and delivers a maximum of 1050 h.p. at 1900 r.p.m. A much smaller design, the A-30, is normally rated 600 h.p. at 2600 r.p.m. From this same series has been developed the famous racing models. The A-S-3 delivers 1000 h.p. at 2500 r.p.m., and the A-S-5, with three-fourths its displacement, develops the same output at 3300 r.p.m. The weight of the latter design represents less than three-quarters of a pound per horsepower.

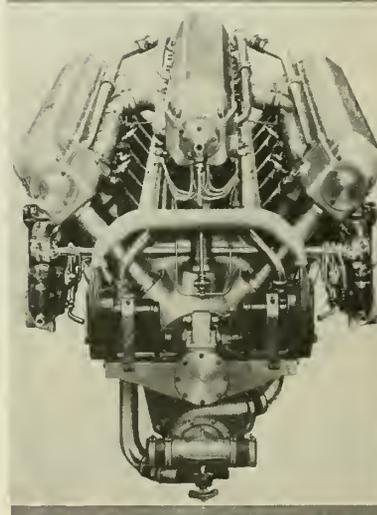
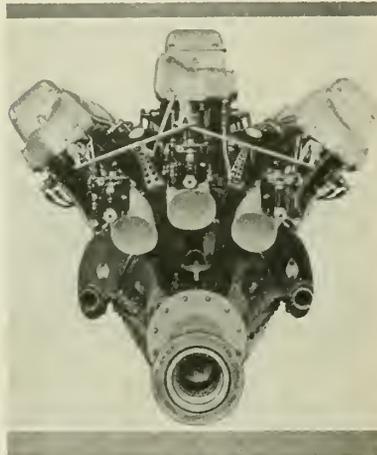
The most powerful aircraft engine constructed to date is the Fiat A-S-6, rated 2800 h.p. at 3200 r.p.m., and is said to weigh only 2050 lbs., or .732 lb. per h.p. Not only is this engine featured by its great output and low weight, but it marks a new step in construction. It consists of two twelve-cylinder units joined to a central double auxiliary gear case. Each group has its independent crankshaft, with each shaft fitted with a spur gear meshing with a gear in the central gear case to drive its respective propeller shaft. These are mounted in the V and revolve one inside the other, and are respectively integral with a ground adjustable-pitch propeller boss. Thus in this arrangement the engine drives two coaxial propellers, positioned one behind the other at the front of the engine, and turning in opposite directions at the same speed. A large supercharger is fitted.

Another well-known Italian firm—Isotta-Fraschini, the largest producer of aeronautical engines in Italy—has also shown great progress in the development of large power plants. Three types of engines, with eighteen cylinders in the customary 40° arrangement, and of rather similar construction have been produced. The smaller engine of this group, the Asso 750, is said to normally develop 880 h.p. at 1750 r.p.m., and have a maximum output of 940 h.p. at 1900 r.p.m. The recent flight of twenty-four Savoia-Marchetti S.55X seaplanes from Italy and return has demonstrated the depend-



Isotta-Fraschini Cantilever 1100-horsepower engine

ability of the Asso 750. Each ship was powered by two of these units mounted in tandem, one functioning as a tractor and the other as a pusher. Additional data and illustrations of this engine appeared in the August issue of AERO DIGEST.



Isotta-Fraschini 1800 h.p. engine and below it the 18-cylinder 1000 h.p. model

The Isotta-Fraschini Asso 1000 is rated 1000 h.p. at 1700 r.p.m., and a larger engine, designed especially for use by Italian military aviation for high altitude operations, was rated 1800 h.p. at 2700 r.p.m. When this engine was publicly exhibited in this country for the first time in 1930, it was said to be the most powerful aircraft engine in the world, and that its weight was only .75 lb. per h.p.

Isotta-Fraschini has also developed an engine which is probably the most powerful twelve-cylinder V type ever constructed. It was exhibited at the Aircraft Show, Madison Square Garden, New York, May, 1930, where it attracted considerable attention. This 1100-h.p. unit is known as the "Cantilever," and it incorporates several interesting features. Perhaps the most unusual of these is the fact that such a large output is delivered by an engine of this form without the aid of a supercharger. It is claimed that the dry weight (complete with propeller reduction gears) is 970 lbs., which represents only .881 lb. per horsepower. Of special interest is the structural arrangement, which provides drives for magnetos and water pumps at the front of the engine and leaves the back free of such auxiliaries. Along with this arrangement has been developed a special mount, which permits the engine to be mounted in a cantilever fashion at the rear end. Three supports are provided in the specially designed crankcase.

The only other development in the high horsepower field originating in Italy, upon which information is available, is the Behmann six-cylinder double-acting heavy-fuel engine rated 980 h.p. at 1800 r.p.m., which is reported to weigh 1408 pounds. Evidently this design is still in the experimental stage, because little has been heard of it since the announcement and descriptions concerning its construction appeared about two years ago.

(To be continued in the November issue)



The Douglas DC-1 Airliner

DONALD W. DOUGLAS

President, Douglas Aircraft Company



● Incorporating the experience gained by Transcontinental & Western Air, Inc., the Douglas Aircraft Co., and its subsidiary, the Northrop Corp., the new Douglas DC-1 transport successfully completed test flights and was accepted by the airline company. Work on twenty additional planes of this model is in progress at the Douglas plant in Santa Monica, Calif. Built under TWA specifications, engineered and wind tunnel tested for months, the new all-metal airliner embodies the latest developments in air transportation.

Responsibility for the design includes H. H. Wetzel, vice-president; J. H. Kindelberger, chief engineer; A. E. Raymond, assistant chief engineer, and F. W. Herman, project engineer, all of the Douglas Co., who have worked in close collaboration with the TWA management.

The Douglas DC-1, a low-wing cantilever monoplane, is powered with two Wright Cyclone 1820-F-3 engines, geared 16:11, each developing 710-horsepower at altitude is 210 miles an hour. At 12,8,000 feet. The high speed at rated 000 feet, cruising speed at $\frac{3}{4}$ throttle is 200 miles an hour, while a 186 miles an hour cruising speed is attained at 62.5 per cent full throttle at 14,000 feet.

The cabin is 6 feet 3 inches high and 5 feet 6 inches wide, normally fitted to accommodate 12 passengers in six rows of two each, spaced 40 inches from seat back to seat back. The width is such that

a seating capacity of 18 is possible for operations where such roominess is not essential. A cargo compartment having a capacity of 1,000 pounds is forward of the cabin and a baggage compartment with space for passengers' baggage is in the rear. The cockpit accommodates pilot and co-pilot with dual controls provided. With the recent removal of the radio equipment to the rear of the fuselage two more seats have been provided without affecting performance.

Passengers' seats are fully adjustable and mounted in rubber to minimize vibration. The design allows for individual adjustment of seat bottom and back, the latter being reversible to permit passengers to face either direction.

There are no structural obstructions in the aisle, for the cabin floor passes over the wing. Passengers' seats are high enough above the wing to provide excellent vision

Sound-proofing of the cabin was accomplished with Seapak installed under the direction of Sperry Gyroscope Co., engineers, who obtained a sound level at cruising speed below 70 decibels above 1 mb., which compares favorably with Pullman car ratings. The interior is finished in a washable sanitary fabric, an entirely new feature in sound-proofing work. Ventilating and steam heating systems have been worked out in connection with the sound-proofing development. Controlled ventilation is effected by admitting air through a vent in the

nose and leading it by ducts to the cockpit, cabin and lavatory. A thermostat insures that the temperature in the cabin will be maintained at 70° F. with outside air temperature as low as 20° below zero.

Entrance to the cabin is through a door on the left side. Aft of this door is the buffet, which has an ice-box and facilities for serving meals aloft. The lavatory is situated at the rear of the cabin.

Practically the entire structure is constructed of the new 24S alloy (principally 24SRT Alclad) developed by the Aluminum Company of America. It is used in sheets, bars, tubes, castings and extruded shapes. The strength of this material, particularly the yield point, is appreciably greater than alloys formerly in use. The wing is of cellular, multi-web construction, as developed by John K. Northrop and used on Northrop "Alpha" transports. The center portion of the wing is integral with the fuselage and serves as a mount for the nacelles and retractable chassis. The airfoil section at the root is the NACA 2215 tapering to the NACA 2209 at the tips.

The outer wing panels are demountable by means of a flanged bolt joint. Fuel is carried in two main tanks of 180 gallons each, and two auxiliary tanks of 70 gallons each, mounted in the wing center section on either side of the fuselage. Main tanks are fitted with dump valves controlled from the pilot's cockpit. Both the fin and the stabilizer are fixed in position, trim being maintained by means of tabs in the trailing edges of the rudder



Full front view of the new Douglas DC-1 transport plane, showing its unusually clean lines

and elevators. The empennage lines are particularly clean and have low drag expanding fillets where surfaces connect with the body, terminating in a cone carrying a navigation light. Controls are internal, including those for the trimming tabs.

The retractable landing gear is operated by a single hydraulic mechanism. Retraction is accomplished in 25 seconds and lowering in 20 seconds, by means of a pump which may be operated by either the pilot or co-pilot. The landing gear is counterbalanced, permitting it to be operated by manual power. Bendix hydraulic brakes, which may be applied by either the pilot or co-pilot with a differential control operating through the rudder pedals, are used. The chassis wheels retract upward and forward into the nacelles. In the retracted position, the axles rest in sockets attached to a main nacelle bulkhead, and, in the event of emergency, the plane may be safely landed on its wheels in the retracted position with no damage except to the propeller tips. Since the wheels in retracted position are several feet ahead of the center of gravity of the airplane, an actual test showed that there is no tendency to nose over during such a landing. Visible and audible warning devices are provided to advise the pilot of the position of the landing gear. The wheel tread is 18 feet and the main wheels have 42 by 15-inch Goodrich tires. The tail wheel has a 17 by 7-inch tire.

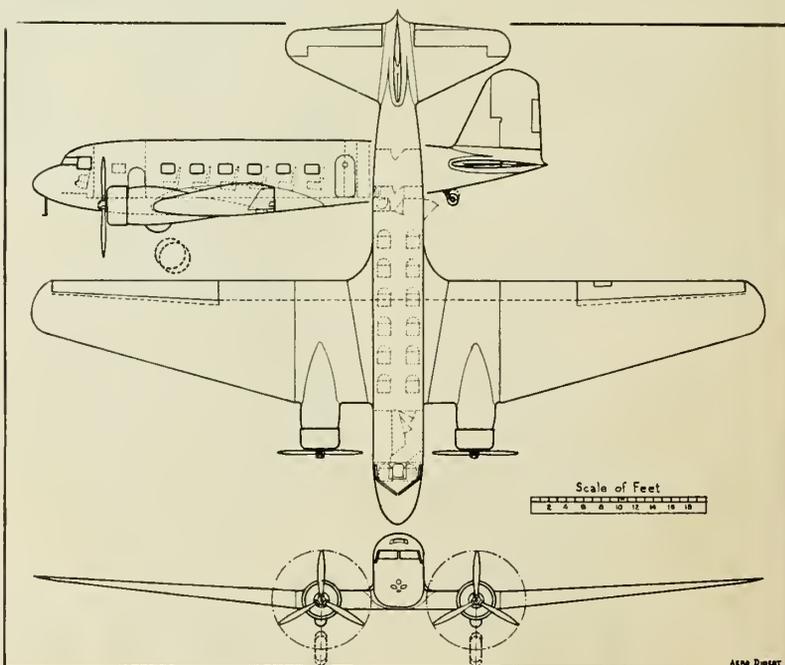
Engine nacelles are monocoque except for the engine mount itself, which is of welded steel tubing. The mount and all items forward of the firewall (including the oil system and engine cowling) are quickly detachable and interchangeable right and left. Removal is facilitated by grouping all connections at the firewall and by the use of quickly detachable plugs for all electrical connections. Mounting of the engine structure to the firewall is made through rubber bushings which reduce the transmission of vibration to the airplane structure. Exhaust collector ring

outlets are below the wing, thus shielding the cabin from the noise and glare of escaping exhaust gases. The carburetor air intake preheater (which has a capacity sufficient to prevent icing of the carburetor during the coldest weather) is fitted with a valve controllable from the cockpit and a thermometer located in the cockpit. Direct Eclipse electric starters with shielded booster coil are used. Three-bladed Hamilton Standard controllable pitch propellers, 11 feet 6 inches in diameter, are standard equipment. Clearance between the propeller tips and body is 10 inches. A pressure fire extinguisher system serves both engines, controlled by a selector valve in the cockpit.

Excellent vision is possible from the pilots' cockpit. It is roomy and comfortable and has been designed to eliminate reflections and glare; normally it is

reached through a corridor from the passenger cabin, but an exit is provided in the roof together with a folding hatch for observation and navigation. For the latter purpose, a drift indicator and chart board are provided. Pilots' seats are adjustable vertically and as to tilt; they are comfortably upholstered and have arm rests. Movable panel windows with shatter-proof Libby-Owens-Ford laminated glass form the windshield and are arranged so they may be wiped off externally during flight.

Dual controls are of the individual wheel type with pedal foot controls. The control column is next to the fuselage skin and does not interfere with members of the crew getting into or out of their seats. Complete instrument equipment, principally of Pioneer manufacture, is of the latest design, grouped to facilitate easy inspection and service.



Scale outline drawing of the DC-1, showing seating arrangement

Sperry artificial horizon, and directional gyroscope, are installed. The board is mounted on flexible rubber bushings, designed and placed to reduce vibration to a minimum. The latest type Western Electric two-way radio system, including direction beacon receiver, has been installed under TWA specifications. Wiring is carried in separate Breeze flexible aluminum conduits, one set each for low-voltage and high-voltage radio leads. A pair of three-minute electric flares are mounted in the rear of the fuselage.

Two 35-ampere landing lights are mounted in the nose of the fuselage, together with a warning light. There are the customary navigation, instrument and cockpit lights and each passenger has a reading light, which he can control.

Specifications

Wing span	85 feet
Length	60 feet
Height overall	16 feet
Wing root chord	170 inches
Wing tip chord	68 inches
Wing incidence	2 degrees
Dihedral, median line.....	5 degrees
Aspect ratio	7.70
Wing area	940 square feet
Volume, passenger cabin and lavatory—	
780 cubic feet	
Volume, front baggage space..	108 cubic feet
Volume, rear baggage space..	112 cubic feet

Areas

Fin	28.9 square feet
Rudder	42.5 square feet
Stabilizer	97.6 square feet
Elevators	48.0 square feet
Wing flaps	117.8 square feet
Ailerons	86.8 square feet

Weights

Crew (two)	340 pounds
Wt. empty (incl. radio and equip't)	
11,780 pounds	
Gross weight	17,500 pounds
Power loading..	12.3 pounds per horsepower
Wing loading..	18.6 pounds per horsepower
Useful load	5,720 pounds

Weights (Normal)

Passengers (twelve).....	2,040 pounds
Gasoline (300 gallons).....	1,800 pounds
Oil (24 gallons).....	180 pounds
Baggage	360 pounds
Cargo	1,000 pounds
Total pay load.....	3,400 pounds

Weights (Maximum)

Passengers (ten).....	1,700 pounds
Gasoline (500 gallons).....	3,000 pounds
Oil (40 gallons).....	300 pounds
Baggage	300 pounds
Cargo	80 pounds
Total pay load.....	2,080 pounds

Performances

Max. speed at 8,000 feet..	210 miles an hour
Cruising speed at 8,000 feet,	
75% power.....	190 m.p.h.
Cruising speed at 8,000 feet,	
62.5% power.....	177 m.p.h.
Landing speed .....	.60 miles per hour
Rate of climb at 8,000 feet..	950 feet per min.
Service ceiling	23,000 feet
Absolute ceiling	25,000 feet
Cruising range, 300 gallons.....	730 miles
Cruising range, 500 gallons.....	1,200 miles
Altitude, full load, one engine..	9,000 feet

Digest of Technical Articles from Foreign Publications

ELSA GARDNER

Valve Spring Surge

Surging in Helical Valve Springs, J. Dick. Royal Aeronautical Society Journal, Vol. 37, No. 271, July, 1933, pp. 641-654.

A THEORETICAL treatment is given for the distribution of surge stresses in the valve springs of a high-speed internal-combustion engine, and is applied not only to uniform springs, but also to tapered and barrel-shaped springs with suggestions for methods of minimizing the effects of these stresses. The author considers that the results of varying the pitch towards the end of a spring is worth considering. He thinks that such a variation, in addition to limiting the maximum stress in the end coils would have other important effects, such as altering the form of the wave during the reflection, and decreasing the effective length of the spring as the load on the spring is increased, owing to closing of the end turns. In the appendix, the author derives the expressions for speed of propagation of disturbance, frequency of the spring, effect of an impulse applied to the end of the spring, change in stress caused by a disturbance, energy imparted by a given movement of the end, distribution of energy in the propagation of a single disturbance, overlapping of disturbances travelling in opposite directions, reflection at a fixed end, effect of continued periodic motion of one end of a spring, and the case of one end moved with simple harmonic motion.

Inspection Methods

Inspection. Automobile Engineer, Vol. 23, No. 306, May, 1933, pp. 169-170, 2 figs.

ROUTINE INSPECTION employed by the Bristol Aeroplane Co. to insure quality and accuracy is described. The 100 per cent inspection carried out before any material enters the factory is outlined. Control of material inspection is vested in the works laboratory, and technical instructions as regards the inspection of materials are laid down by the chief metallurgist. Methods of inspecting castings, stampings, case-hardening steels, sheet material and tubes are taken up.

Aerodynamics

The Effect of Turbulence on the Aerodynamic Characteristics of an Airfoil (L'effetto della turbolenza sulle caratteristiche aerodinamiche delle ali), B. Randisi. L'Aerotecnica, July, 1933, pp. 867-889, 20 figs.

RESULTS OF experiments undertaken by the Italian Air Ministry to study the influence of a wire upon the charac-

teristics of the airfoil placed near it are described. Various airfoils were tested as well as various positions of the wire, with the result that both an increase of lift and a decrease of drag in the whole range of stalled incidences were obtained. Due to turbulence produced by the wire, the tendency to stall was put off, and even if an increase in maximum lift was not obtained, the form of the polar was modified so that the ordinates of the curve after the maximum descended very slowly, and in most favorable cases they remained constant in a long range of incidences.

Experimental Research of Marey on Motion in Air and Water (Recherches expérimentales de Marey sur le mouvement dans l'air et dans l'eau), P. Nogues. Publications Scientifiques et Techniques du Ministère de L'Air, No 25, 1933, 97 pp., 147 figs.

GENERAL METHODS employed by Etienne-Jules Marey during the first half of the nineteenth century for analyzing the flight of insects and birds are described by the chief of the Institut Marey. He describes the chronostylograph constructed by Marey for the mechanical inscription of the motions themselves, and the chronophotograph with which he studied the locomotion of a great many animals. After describing the apparatus for observing locomotion in water, the author goes on to aerial locomotion and explains the various methods Marey used for determining the frequency of the wing motion of insects and different positions the wing occupied during a revolution, and to the application of the same methods to the study of the flight of birds. He concluded with details of Marey's work on the mechanics of fluids and its applications to present-day aerodynamics.

Air Torque on a Cylinder Rotating in an Air Stream, A. Thom and S. R. Sengupta. (British) Aeronautical Research Committee—Reports and Memoranda No. 1520, October 2, 1932 (Published August 14, 1933) 7 pp., 10 figs.

AIR TORQUE on a rotating cylinder was measured throughout as large a range of rotational speed and wind speed as could be obtained and the results expressed as non-dimensional coefficients. It was found that throughout the greater part of the range, torque was approximately proportional to the product of the wind speed and rotational speed. The resultant air force on the cylinder remained at roughly the same distance from the cylinder axis throughout the greater part of the range, namely, about 0.008 X diameter. Sanding the cylinder surface increased the torque from 2 to 3 times and affected the eccentricity similarly.

Fuel Knock Ratings

The Knock-Rating of Fuels, D. R. Pye. Aircraft Engineering, Vol. 5, No. 54, August, 1933, pp. 177-180, 1 fig.

RESULTS OF an investigation are summarized which were obtained by a committee set up by the Institution of Petroleum Technologists to find the correlation of knock rating as determined in a test engine with results obtained using airplane-engine cylinders. The substandard employed was fuel B2 prepared by the Standard Oil Development Company and its knock rating was altered by additions of tetra-ethyl lead. Samples of nine different aviation fuels were set aside which represented a wide variety of composition and covered a range of octane numbers from 70 to 80. These samples were matched against the substandard in water-cooled and air-cooled airplane-engine cylinders at the Royal Aircraft Establishment and at the Bristol Aeroplane Company plant. The author concludes that the C. F. R. engine with a mixture temperature of 260 degrees Fahr., but operated in all other respects according to the motor method, gives a very satisfactory correlation with air-cooled airplane-engine cylinders operating under supercharged conditions.

Firing Field

The Field of Fire from Airplanes (Les champs de tir en avion), L. Kirste and L. Favre. L'Aéronautique, Vol. 15, No. 168, May, 1933, pp. 117-119, 10 figs.

A NEW PROCEDURE is explained for determining the field of fire from airplanes and is based upon the principle of panoramic projection. This method takes into account the circular continuity of the field of fire and reports the interruption of the image which exists for all representations in the plane of a sphere. A pure globe of dead sections in an airplane can be obtained very readily and the weak points of defense disclosed with extreme rapidity.

Airplane Stability

The Tests of Stability (Les essais de stabilité), J. Quessette. Discussion by Maurice Roy. L'Aéronautique, Vol. 15, Nos. 169 and 170, June and July, 1933, pp. 49-56 and 65-67, 1 fig.

A SCHEME designed by the author for stability tests in a wind tunnel is outlined and opinions of Roy, Haus, Naylor and Prandtl are discussed. The author describes a unique test by which it was possible without any calculations, to determine for each elevator angle of the test model, not only the different characteristics of a corresponding airplane (period and decrement), but also the drag and lift coefficients. These tests can be made practical with an astatic arrangement of suspension, the airplane flying without an engine, or with engine shut down. Besides these tests, the author suggests tests of stability at altitude which

can be made in a variable-density wind tunnel, and stability in diving and spinning which can also be studied. He believes his method of testing adaptable to determining the stability of flying wings, autogiros and helicopters.

Aviation Records

Tables of Aviation Records (Tableaux des Records d'Aviation), L'Aéronautique, Vol. 15, No. 168, May, 1933, eight supplementary pages.

TEN TABLES are given which were compiled by the F. A. I., showing world records made by aircraft up to March 31, 1933. The first five are devoted to seaplanes and cover those without a specified load, those by progressive loading, light seaplanes, as well as world records for airplanes, seaplanes and balloons with and without refueling. The same information is given for airplane records, and in both cases, the names of planes, engines, country and pilot, as well as the number of miles flown, are covered.

Engine Fuel Supply

Fuel Supply in an Internal Combustion Engine (L'alimentazione dei motori a combustione interna), P. Ferretti. Rivista Aeronautica, Vol. 9, No. 7, July, 1933, pp. 38-78, 25 figs.

THE PROBLEM of supplying an internal combustion engine with fuel and air to maintain sea-level power at high altitudes is discussed. The author takes up theoretical indicated horsepower, real indicated horsepower and effective horsepower for five types of airplane engines. He defines these as the underfed engine in which the weight of air fed to the cylinders at high altitudes is somewhat lower than that in normal sea-level operation; the constant-fed engine in which the weight of air fed at altitudes corresponds to that fed in normal operation, including the over-size engine, the one with mechanical compressor and the one with turbo compressor; and the over-fed engine in which the weight of the air is higher than that fed at sea level.



Kellett K-4 Autogiro

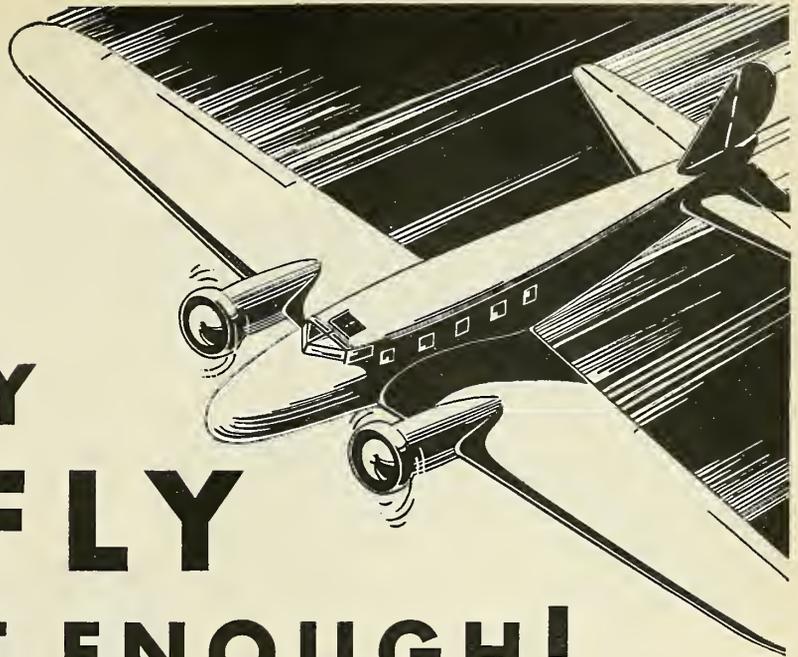
• POWERED WITH the 210-horsepower Continental R-670 engine, the Kellett K-4 autogiro features a number of improvements over previous models in appearance, performance and structure. Reduction of the fixed wing area has provided greater visibility downward and improved the flying qualities. The new type undercarriage is entirely strut-braced and provided with streamline fairing. The cockpit has been enlarged and doors provided on either side, assuring easy access. The pylon structure is entirely faired and the pylon system reduced to two vertical members supported on either side by streamlined wires. A steerable tail wheel increases ground maneuverability. The K-4 is of the side-by-side open cockpit type, but a demountable cabin top can be furnished.

Other features include: Mechanical fuel pump with hand wobble pump for emergency use; Heywood type com-

pressed air starter; cockpit primer; demountable dual controls; metal propeller; low pressure tires with wheel brakes; parking brakes; oilhydraulic shock absorbers on undercarriage and tail wheel; fire extinguisher; navigation lights; padded and spring upholstery, and Friesse type ailerons.

Specifications

Gross weight	2400 pounds
Useful load	780 pounds
Length	19 feet 11 inches
Span	24 feet 7 inches
Wing area	63 square feet
Height	12 feet 3 inches
Rotor diameter	40.6 feet
Blade area	120 square feet
Disc area	1295 square feet
Gasoline capacity	45 gallons
Oil capacity	5 gallons
Cruising speed	93 miles per hour
Top speed	114 miles per hour
Cruising range	3.5 hours
Rate of climb, full load	.940 feet per minute
Ceiling	14,000 feet
Service ceiling	12,500 feet



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In addition each student receives 220 hours of flying instruction . . . many hours of precision flying on Whirlwind Travel Airls; 15 hours on a Warner Travel Air; 20 hours on a Monocoupe; 20 hours on a Dep (wheel) Control Waco

Cabin ship; 14 hours of Whirlwind night flying; 12 hours solo on a Lockheed; 14 hours on a 5000 pound gross weight cabin ship; 10 hours of instrument (blind) flying; 10 hours of radio beam flying; 200 miles of night and 800 miles of day cross-country flying. The whole matchless course can be completed in 20 months, and is equivalent to 4 years of college in other professions.

The man who right now cannot afford the time or money for the entire course may enroll for one division . . . for example, the Airplane and Engine Mechanics' Course . . . complete that training and work in the industry for months or a year . . . then return and complete a second division, again work in the industry and ultimately complete the entire Executive Transport Course. Thus he may pay for two-thirds of his training out of earnings.

Parks graduates can be found in every part of the United States and Canada, South America, Siam and China. They are working for leading firms, such as American Airways, Transcontinental-Western Air, National Air Transport, Pan American Airways, Boeing Air Transport, Curtiss-Wright, Lockheed, Douglas, Waco and many others.

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NEW EQUIPMENT and METHODS

Test Synthetic Rubber For Use in Aircraft

• SYNTHETIC RUBBER is being substituted for genuine rubber in aircraft hose and gaskets in a series of tests being conducted at the Materiel Division, Wright Field, to determine the practicability of the former over the latter. Superiority of the synthetic product over the genuine is evidenced at normal temperatures and where there is a solvent and a swelling action on the rubber as a result of contact with fuels.

Development of synthetic rubber for aircraft uses is felt to be a boon under emergency conditions, since it would eliminate the necessity of providing genuine rubber which must be imported, and could be produced domestically in any amount which might be required.

Signalling Lights Developed for Airmen

• THE CLEVELAND laboratories of the Westinghouse Electric & Manufacturing Co. are now service testing a new lightweight signalling spotlight which they developed for flyers. The spotlight is of approximately 150,000 candlepower and can be operated by a signalling shutter mounted directly in front of the unit and worked by a small hand trigger capable of blinking the light at extremely high speeds.

In addition to its use as a signalling device, the unit is adaptable as a searchlight. Used for signalling, the unit has a range up to five miles. As a searchlight, it is said to be effective from two to three hundred yards.

Rust Remover for Cooling Systems

• A PRODUCT that is designed not only completely to remove rust scale and corrosion from engine radiators but also to form a thin non-accumulating film which prevents further deposits is No-rust. The product is also reported to produce clear, conditioned water throughout the cooling system; to preserve rubber, and to be harmless to metal and to paint finishes. Rust Eliminator, Inc., has taken over Mogaco Laboratories, Inc., of Buffalo, N. Y., manufacturers of the product.

Scales for Weighing Transport Planes

• IN PROVIDING the weighing equipment for the new Boeing transport planes, an unusual problem was presented by the Boeing engineers and successfully solved by Fairbanks, Morse & Co. of Chicago, Ill. The requirements for weighing the new type of plane were that the scales should be so constructed as not to

interfere with the wings of the plane. With the new Fairbanks scales only five or six men are required to push the plane upon the scales, where formerly it took as many as 20 men, and the various weights of the ship can be noted in 15 minutes.

The scales are designed to accommodate planes of any size built today. When it is necessary to use the scales at the airports, the scales can be picked up and transported by truck. Hooks are provided by means of which the scales may be handled by cranes.

Each of the two scales used under the main wheels of the plane weighs 1600 pounds. Equipped with roller bearing wheels and castings, each may be handled easily by one man. The wheels are raised above the floor level when the scales have been properly placed.

The beams in the scales are graduated, 4800-pound by 100-pound capacity on the main beam and 100-pound by one-pound on the fractional bar, with a two-inch fractional and a multiple of 156.27 at the butt, which is the regular warehouse full-capacity type. The tare and fractional beam is placed at about a 50-degree angle with the main portion of the beam, so that it can be easily read. The lifting device consists of two sets of rubber-tired wheels placed near the rear of the scale and one rubber-tired wheel in the center of the front of the scale. All wheels are actuated by a ratchet-lifting device, whereby the entire scale can be raised a few inches off the floor when it is necessary to move it from one location to another. When weighing, the scale is lowered so that it rests on the floor.

Each scale is provided with a small metal ramp, approximately two feet in length and the width of the weighing platform, on which the planes can be rolled on to the scale. This ramp is detached when the scale is moved.

Abrasives Coated by Electric Method

• SANDPAPERS made by a new electro-coating method have been produced by several companies and are now available through dealers. In the new process an electric force moves the abrasive particles, setting them upright, in close order and evenly spaced. The electric force then imbeds them in the adhesive backing. The result is sandpaper whose efficiency is reported to be increased by an average of 30 to 40 per cent, since the abrasive particles are equally dispersed and all the cutting edges and tips are upright, so that they work at maximum efficiency.

Electro-coated sandpapers are put out in standard grit numbers from coarse to fine. The abrasive materials are garnet, aluminum oxide and silicon carbide. These coated abrasives are obtainable in the usual forms of rolls, discs, helts and covers for drums.

Radio-Shielding Harness for Airplane Engines

• SEVERAL TYPES of radio-shielding harness for engines in transport and private use have been developed by the Westport Manufacturing Co., Glendale, Calif. With magneto shields attached, all types of Westport harness are complete with ferrules, rubber glands and nuts, ready for installation with either shielded plugs or spark plug shields. The various component parts of the harness are securely joined, promoting positive electrical and mechanical connections.

Type VAG has been introduced for Wasp and Hornet engines with two magnetos. Type SC is for Lycoming nine-cylinder engines, and Type MN may be used on seven-cylinder Continental, Warner and Wright engines.



A new Boeing being "weighed in" on new type scales

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*.....in the air
and on the ground!*

ABOVE: Actual photograph of Ryan students in five ship formation flight practice near San Diego. TO THE LEFT: Students enjoying a noonday "siesta" in the Spanish loggia on the field side of the Ryan Administration Building.

Beautiful modern buildings erected by RYAN specifically for student needs; courses which greatly exceed Department of Commerce requirements; Government Approved repair shops for mechanics courses and ground school; perfectly maintained flying equipment of the latest type including a wide variety of modern planes and motors; commercial operations augmented by frequent daily schedules of major airlines; North Island—the government's largest military aeronautical operating base—with huge shops and over 300 military planes; and San Diego's famous semi-tropical year 'round weather. . . . All these combine to make the RYAN SCHOOL OF AERONAUTICS the objective of those who demand the best.

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I am interested in the courses checked; please send additional information.

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NEWS OF THE SCHOOLS

Student Research Aids Aeronautics

RESEARCH WORK conducted by universities giving courses in aeronautical engineering, on troublesome structural and aerodynamic problems selected by the Aeronautics Branch of the Department of Commerce as needing special study, has resulted in many valuable contributions to aeronautics, according to Eugene L. Vidal, Director of Aeronautics. The results of these studies are submitted to the Branch, which coordinates them and selects the more valuable information for use in formulating design rules. Where practicable, this information also is made available to engineers, designers and others to whom it will be useful.

Mr. Vidal particularly mentioned the University of Detroit, Massachusetts Institute of Technology, Leland Stanford University, the University of Minnesota and New York University as being institutions which are actively cooperating with the Aeronautics Branch in this work. For several years, Mr. Vidal stated, Massachusetts Institute of Technology has been building and testing various examples of detailed design commonly used in all-metal airplanes in an effort to learn more about the load distributions within the structures and the loads which various structural combinations carry.

The University of Detroit and New York University have been collaborating with the Aeronautics Branch on a study of shock-absorber struts to determine the effects of various factors, such as the rate of application of load, the effects of different types of struts in combination with various tires, and other problems in this connection. Many of the strut manufacturers also have installed test equipment and are working on these problems.

The use of jury struts has for some time introduced difficult problems to the engineer, as no complete analyses of their effects have been available. Recently the Aeronautics Branch received theses giving detailed analyses of this problem from two post-graduate students, one at Leland Stanford University, and the other at the University of Detroit, which add substantially to the knowledge of this subject.

Flying Instruction at New City, N. Y.

ROSMOND BLAUVELT, a recent graduate of the Ryan School of Aeronautics, San Diego, Calif., has started his own field of aeronautical operations at New City, N. Y., and has reported that he has as much student and passenger business as he can handle with his one plane, a 1933 Great Lakes. He is also acting as Great Lakes dealer in that territory. Mr. Blauvelt was awarded the

gold Ryan precision medal for proficiency in flight work during his training period at the Ryan school.

COURSE IN AIR LAW TO BE GIVEN

A NEW course in aeronautical law will be given at the Brooklyn Law School, Brooklyn, N. Y., as part of the work in the graduate school. The course will be under the direction of John A. Eubank and will include such topics as property rights, damages, liabilities, insurance, regulation of schools, airports, aircraft, patents, taxation, etc.

Air School In Louisiana Opens

THE AVIATION department of Louisiana State University, Baton Rouge, opened September 20 with Lieut. John P. Fraim in charge. Courses in aeronautical engineering and commercial aviation are being given. Local civic interest and capital for the establishment and maintenance of the department were responsible for the addition of the course to the school curriculum.

With the delivery of a plane, courses in flight training will be available to all students of the university, preference being given to students who are enrolled in the aeronautical school.

Students Make Cross-Country Hop

FIVE MASTER pilot students at the Boeing School of Aeronautics, Oakland, Calif., were taken on a 2,200-mile cross-country flight by George Myers, director of flight instruction. The trip was accomplished in three days, with stop-overs at Salt Lake City and Cheyenne, where the students inspected United Air Line facilities.

The flight was made in a P. & W. Wasp-powered Hamilton monoplane.

Albany Club to Use Plane

A DAVIS MONOPLANE has been bought by Earl Griebisch, president of the Albany (N. Y.) High School aviation society. About twenty-five members will utilize the ship for their training, and it will be kept at Griebisch's private flying field in Rensselaer, N. Y. Although only 18, Griebisch has had more than 275 hours of solo flight. He is reported to have first soloed a plane at the age of 14.

College Offers Aviation Courses

RIO GRANDE College of Rio Grande, Ohio, is offering its students a course in aeronautics this year. The course will be taught by Professor Willard Lewis.

Scholarships Won For Essays

CURTISS-WRIGHT Technical Institute of Aeronautics, Grand Central Air Terminal, Glendale, Calif., and the Richfield Oil Co. held and completed a prize essay scholarship contest, the subject of which was "Air Transportation Five Years Hence." Prizes valued at more than \$3,000 were awarded with J. M. Luther of Olean, N. Y., receiving the first, a course in aeronautical engineering. Seven other awards were made.

According to O. D. McKenzie, sales manager of the school, enrollment on September 1 was the largest ever experienced. The school offers, among others, a major course in aeronautical engineering which requires one year to complete and which is designed to supplant the usual four years in college.

Meteorography Course at Boeing

STUDY and laboratory work in the registration and interpretation of meteorological phenomena, including the making of weather maps and forecasting, is featured in a course in meteorography covering thirty-six hours of work, offered at the Boeing School of Aeronautics, Oakland, Calif.

Cleveland School Gets Wind Tunnel

A WIND TUNNEL has recently been completed at the Worcester Reed Warner Laboratories, Case School of Applied Science, Cleveland, Ohio. The tunnel is approximately 30 feet long and has a cross-sectional area of 81 by 81 inches at its widest part. To assure a wide range of steady non-pulsating air flow at all velocities, special adjustable equipment was designed and installed.

Spartan Enrollment Increases

EIGHTEEN NEW students have been enrolled in the Spartan School of Aeronautics, Tulsa, Okla., during the past 60 days, five of them taking the transport course, seven the limited commercial, three the master mechanic and three the master mechanic flight course.

A special course in aircraft radio was started under Harold Sears.

Two New Instructors Named

PROFESSOR E. L. LUCAS of the Mechanical Engineering Department of State College, Miss., will have assisting him Kenneth Withington as instructor and pilot and Sumpter Camp as flying instructor.

The school recently announced an aviation course.

Club Promotes Air Education

ARTICLES of incorporation have been filed by the Milwaukee Aviation Club to promote education in matters concerning aviation. Incorporators are C. D. Case, V. Zimmerman and A. J. Tank.

AERONAUTICAL INDUSTRY

Vidal Heads Aero Branch

AS A RESULT of a reorganization of the Aeronautics Branch of the Department of Commerce, Eugene L. Vidal was selected to head the Branch as Director of Aeronautics. Although the office of Director of Aeronautics was created some time ago, it remained unfilled pending reorganization of the Branch by Secretary of Commerce Roper.

Two major divisions now constitute the Aeronautics Branch; one, the Air Navigation Division and the other, the Air Regulation Division. Rex Martin, who has been serving as Assistant Director in Charge of Airways, will head the first and Major J. Carrol Cone, who has been Assistant Director in charge of Aeronautic Development, will head the latter.

Radio Research and Airways Mapping, as well as the work of the Airport Section pertaining to airport engineering consultation become a part of the Air Navigation Division under the new plan. Airport Promotion and Rating are now under the activities of the Air Regulation Division while the Administrative Section and the Aeronautic Information Section come under the supervision of the Director of Aeronautics.

The Air Navigation Division is segregated into three subdivisions including one for airline inspection, another for general inspection work covering miscellaneous flying and the third for registration, engineering, medical, accident and enforcement work.

Mr. Vidal, an active pilot for more than 12 years, has long been prominently identified with civil and commercial flying, notably scheduled air transportation. He was one of the founders of the Ludington Line, serving actively as vice president and general manager. Born in Madison, South Dakota, April 15, 1895, Mr. Vidal was educated at the University of South Dakota and at West Point, from which he was graduated with a commission in the Engineer Corps. He began his flying career when he transferred to

the Air Service in 1920, subsequently returning to West Point as instructor. When Transcontinental Air Transport was organized in 1926, Mr. Vidal resigned from the Army and went with the company as assistant general manager. He also served on the technical committee of which Colonel Lindbergh was chairman. While at West Point, Mr. Vidal was considered one of the greatest athletes there and in 1926 he participated in the Olympics at Amsterdam.

Secretary Roper is confident that under the new plan of organization, the Aeronautics Branch will be able to function with a higher degree of efficiency than in the past and will be able to render a greater service to the industry and to the public.

Boeing Builds Fifteen More 247's

WITH THE LAST of the 60 twin-Wasp monoplane transports delivered to United Air Lines, work on 15 additional planes of the same type for the general market is under way at the Seattle factory of the Boeing Airplane Co. All materials have been received, work in the preliminary shops is being rushed and body bulkheads are being fabricated. First body assemblies are expected to be under way shortly.

Test flights of the 247-A, built for use by United Aircraft & Transport executives, were scheduled for last month. The plane is similar to the 247 transport, except that it is powered by 650-horse-powered twin-row P. & W. Wasp Junior engines and provides 8, instead of 10, chairs.

Two Trade Divisions Merged

THE AUTOMOTIVE and the Aeronautics Trade divisions of the Bureau of Foreign and Domestic Commerce have been consolidated into one division, to be known as the Automotive-Aeronautics Trade Division. A. W. Childs, formerly chief of the Automotive Division, has been placed in charge of the new unit.

Aircraft Production Value Increases

DELIVERIES OF AIRCRAFT and engines during the first 7 months of 1933 were slightly ahead of production, according to the Aeronautical Chamber of Commerce. While 684 airplanes and 1255 engines were manufactured for the commercial and military markets, 699 airplanes and 1319 engines were delivered.

The value of all airplanes and engines produced during the first 7 months of the year exceeded that for the same period of 1932 by 32 per cent. At the end of the first 6 months, the current year was 26 per cent ahead of last year. Deliveries at the end of the first 7 months were 28 per cent ahead of the first 7 months of last year as compared with 22.1 per cent at the end of June.

Three hundred fifty-seven commercial airplanes, valued at \$4,351,027 were produced during the first 7 months and 370 units, valued at \$4,381,202 were delivered. Although these figures represent a value less than the value of similar units produced in 1931, they are nevertheless far in excess of the 1932 totals. Production of 327 military airplanes and delivery of 329 units also resulted in a valuation which exceeded 1932 totals.

Of the 1255 engines produced, 662, worth \$2,801,436, were for the commercial market; the balance, 327, valued at \$6,852,395, were for military purposes. Deliveries of commercial engines totaled 719 units and military deliveries amounted to 600 units.

Biplane production included 161 units while monoplane production was up to 177. Seventy-three units were either of cabin monoplane or biplane multi-engined construction.

Rowe Heads Dallas Aero Branch

RECENT CHANGES by the Department of Commerce brought Charles A. Rowe to Dallas, Texas, from Los Angeles to succeed Robert I. Hazen as head of the local Aeronautics Branch. Hazen has been transferred to Atlanta.

(Continued on following page)

Coming Events

Concentration of civilian aircraft in demonstration at College Park Airport, Md. OCTOBER.

National air treasure hunt, beginning at St. Louis, Mo., and ending at New York, N. Y., under the auspices of the U. S. Amateur Air Pilots Assn. and Bernarr Macfadden. OCT 3-7

Air cruise of private planes from Washington, D. C., to New

York, N. Y., in connection with National Charity Air Pageant. OCT. 7.

National Charity Air Pageant for sportsmen pilots, under the auspices of the Judson Health Center, the United States Amateur Air Pilots Association, the Sportsman Pilot Association of America and the Emergency Exchange Association for the Junior League Chapters, at

Roosevelt Field, Mineola, L. I., N. Y. OCT. 7-8.

Third annual meeting of the National Association of State Aviation Officials at the Hotel Stinton-St. Nicholas, Cincinnati, Ohio. OCT. 12-14.

German air sport exhibition at Hanover, Germany. NOVEMBER.

Second International Egyptian Aviation Meeting at Cairo, Egypt, under Aero Club of Egypt auspices. DEC. 18-24.

Thirty-second Annual Confer-

ence of the Fédération Aéronautique Internationale, at Cairo, Egypt. DEC. 20-29.

Annual Dinner, Society of Automotive Engineers, New York, N. Y. JAN. 8, '34.

Sixth Annual Miami All-American Air Races at Miami, Florida. JAN. 11-13, '34.

Annual Meeting, Society of Automotive Engineers, Detroit, Mich. JAN. 22-25, '34.

Dedication and opening, Shushan Airport, New Orleans, La. Air races and events. FEB. 9-13.

(Continued from preceding page)

Boeing Company Elects Officers

ELECTION of C. L. Egtvedt as president and general manager of the Boeing Airplane Co., Seattle, Wash., and that of three other officials to vice presidencies was announced recently, following a meeting of the company's board of trustees. Mr. Egtvedt, formerly vice president, succeeds P. G. Johnson of Seattle, recently elected to the presidency of the United Aircraft and Transport Corp., of which the Boeing company is a subsidiary.

Gardner W. Carr, who has been plant manager of the Boeing company, is now vice president in charge of manufacturing. Erik H. Nelson, formerly sales manager, is vice president in charge of sales, and C. N. Monteith, chief engineer, is now also vice president. Messrs. Carr, Monteith, Nelson and H. E. Bowman, treasurer and auditor, have been added to the board of trustees.

Lockheed Factory Units at Capacity

AN AVERAGE EMPLOYMENT of 200 for a recent month was reported by Robert E. Gross, treasurer of the Lockheed Aircraft Corp., who said that orders placed with the company have necessitated capacity operations in the wood-working and assembling departments. Work is progressing on 6 Orion low-wing planes for American Airways and on a high-wing Vega for the Shell Petroleum Co. A new metal-working unit has been opened for work on the Electra, a twin-engined all-metal plane designed to carry 10 passengers, 2 pilots and mail.

Lycoming to Manufacture Props

WITH REMOVAL of equipment from Cleveland to Williamsport, Pa., the Smith controllable pitch propeller will be manufactured by the Lycoming Manufacturing Co., a subsidiary of the Cord Corporation, which recently acquired all rights of the Smith Engineering Co.

W. H. Beal, president of the Lycoming company, stated that the Smith propeller enables shorter take-off, increased rate of climb and speed and the possibility of obtaining an infinite number of settings with the engine running both in the air and on the ground, an exclusive feature.

Zapon Combines with Brevolite

THE WESTERN business of The Zapon Co., subsidiary of the Atlas Powder Co., was recently combined with that of the Brevolite Lacquer Co., of North Chicago, Ill. A new company, known as the Zapon-Brevolite Lacquer Co., was formed and will continue to do business as before, although it is hoped to eventually move the Zapon offices to the new Brevolite plant in North Chicago.

Officers of the new organization are:

Leonard Richards, president and general manager; Caspar Apeland, general manager; J. W. Hanson, Jr., assistant general manager in charge of operations, research and development, and M. H. Creighton, assistant general manager in charge of sales.

LAWRANCE, COBURN NRA ADVISORS

IN CONNECTION with hearings on the codes for the aviation industry, Frederick G. Coburn and Charles L. Lawrance will act as advisors to the NRA. Mr. Lawrance will be advisor for the airplane and engine manufacturing branch of the industry and Mr. Coburn will serve in the same capacity for the air transport branch of the industry. Lawrance is a former president of the Aeronautical Chamber of Commerce, now president of the Lawrance Engineering & Research Corp., while Coburn is a former president of the Aviation Corp., now associated with Sanderson & Porter, industrial engineers.

Seventeen Flew Over 10,000 Hours

LED BY E. Hamilton Lee, United Air Line pilot, sixteen other pilots have accumulated 10,000 or more hours, according to the Aeronautics Branch of the Department of Commerce. Lee has logged more than 15,000 hours. The total accumulated flying time reported by transport pilots is 11,510,940 hours, an average of 1,638 hours per transport pilot. There are 7,027 licenses active in the transport classification.

Whiteman Now Lycoming Sales Head

AS A PRECEDENT to the inauguration of an extensive sales campaign, Z. H. Whiteman, Jr., connected with the Lycoming Manufacturing Co. for the past fourteen years, has been promoted from assistant sales manager to sales manager. According to F. M. Bender, vice president and assistant general manager of the Cord subsidiary, Mr. Whiteman will be in complete charge of the sales of the entire line of passenger car, commercial car, industrial, marine and aircraft motors.

Brazil Orders More Waco Planes

AN ORDER has been placed with the Waco Aircraft Co., Troy, Ohio, by the Brazilian Government for seven more army planes to cost \$89,000. The Brazilian Government has purchased seventy-one planes from the Waco concern at a cost which is approximately \$800,000.

Security Airster Dealer Appointed

W. B. KINNER, president of the Security National Aircraft Corp. of Downey, Calif., announced the establishing of the first dealership for Security Airsters recently. The Security Sales & Flying Service of Santa Monica, Calif., with headquarters at Clover Field, have taken delivery of their first Airster and have placed orders for two more. E. Spencer and Ray Pignet, who operate the company, have a number of students in training and are arranging the formation of several flying clubs in the manufacturing plants in that district.

The second Airster has been delivered to Lee V. Brusse, who will operate from the field adjoining the Security factory. Twelve more Airsters are under construction, all of which will have the Kinner patented folding wing which is now an exclusive feature on Security Airsters.

Thompson Profit Is \$144,019

A NET PROFIT of \$144,019 after all charges and preferred dividend requirements were deducted has been reported by Thompson Products, Inc., of Cleveland for the six months ended June 30, equal to 50 cents a share on the 263,160 shares of common stock. This report, which includes the Thompson subsidiaries, compares with a net loss of \$13,251 in the corresponding six months of 1932. July's net profit amounted to \$65,715 after interest, depreciation and charges, comparing with a net loss of \$10,989 for the same month in 1932.

Kinner B-5 Gets A.T.C.

THE AERONAUTICS Branch has awarded an approved type certificate on a new 125-horsepower airplane manufactured by the Kinner Airplane & Motor Corp., Ltd., of Glendale, California.

In appearance and design the plane, known as the B-5 Sportster, is similar to the present K-5 100-horsepower Sportster, the principal difference being an increase in power resulting from the use of the Kinner 125-horsepower engine. It has a top speed of 110 miles per hour, and cruises at 100 miles an hour.

State Air Officials Meet in Cincinnati

A THREE-DAY MEETING of the National Association of State Aviation Officials has been called for October 12-14 at the Hotel Sinton-St. Nicholas in Cincinnati. A program providing for an exchange of ideas between representatives of the federal and state governments and those of the aviation industry and general public has been formulated.

Talks are to be made by Eugene Vidal, J. Carroll Cone and Ewing Y. Mitchell of the Department of Commerce; by C. C. Thompson of United Air Lines and by others. The third annual banquet will be held on the evening of the 13th.

(Continued on following page)



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The demand for Penn trained men is a growing demand. This is a natural thing because Penn School, backed by four years' experience as a fully approved Transport, Flying and Ground School, operated by Pittsburgh Aviation Industries Corporation and affiliated with Pennsylvania Airlines is in a unique position to train and advise men for a real career in aviation. No Penn School graduate has ever failed to pass the United States Department of Commerce flying tests. Furthermore, Penn School offers a rare opportunity to enter the flying profession at greatly reduced costs.

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(Continued from preceding page)

Kinner Busy on Production

KINNER Airplane & Motor Corp., Ltd., of Glendale, Calif., reported recently that it has been shipping airplanes as fast as they are finished, sales being considerably ahead of production. The company has contracts covering fifty low-wing monoplanes, and the number of employees has been doubled to take care of the increased demand for airplanes, engines and replacement parts. The company has completed shipment of an order of engines to the Mexican Government through Consolidated Aircraft Corp.

Dealers appointed recently by Kinner include the following: Allan H. Greenwood of Portland, Ore.; Felix T. Williams, Memphis, Tenn.; the Walz Corp., Camden, N. J.; E. W. Wiggins Airways,

Inc., Providence, R. I.; W. A. Speer, San Diego, Calif.; Lake County Airways, Willoughby, Ohio.

Waco Reports Net Profit for First Half

A NET PROFIT of \$55,756, equal to 38 cents a share, has been announced by the Waco Aircraft Co., Troy, for the six month period ending June 30, 1933. This compares with a \$61,213 deficit for the same period in 1932.

According to Sales Manager H. R. Perry the Waco company manufactured twenty per cent of the total of all planes made in this country for domestic use during the period under consideration. For the export market, Perry reports the manufacture of twenty-one per cent of all planes manufactured.

Cord Buys Smith Company

THE CORD CORPORATION has further extended its aviation activities by the purchase of the capital stock of the Smith Engineering Co. of Cleveland, which holds exclusive licenses throughout the world to manufacture the Smith controllable pitch propeller for airplanes.

In the reconstruction of personnel which followed the acquisition, W. H. Beal was chosen president; P. G. Kemp, vice president, and R. S. Pruitt, general counsel and secretary. E. L. Cord heads the board of directors as chairman, while L. B. Manning, R. A. Hock and Beal and Raymond are members.

In addition to the Smith company the Cord Corp. owns in aviation, American Airways, Stinson Aircraft Corp. and the Lycoming Manufacturing Co.

(Continued on page 66)

. Digest of Recent Events .

Pan American To Spend \$5,000,000

COOPERATING WITH the NRA, Pan American Airways is spending \$5,000,000 on developments. Work will start immediately on a million dollar base at Miami and additional contracts for equipment will be let shortly. These will entail an expenditure of close to \$2,250,000. These and other contracts to be let will provide work for 2,500 technicians and engineers.

AUG. 27.

Italian Claims Inverted Flight Mark

LIEUT. TITO FALCONI flew for 3 hours and 6 minutes in an inverted position and after landing at Joliet, Ill., claimed a new world's record for such a maneuver. Milo G. Burcham of Long Beach, Calif., held the old record at 2 hours, 20 minutes. AUG. 28.

French Lines Combined

FIVE AIR transport companies in France merged into one unit known as Air France, a heavily subsidized company which will receive \$8,600,000 from the government in the next year. The merged organization, capitalized at \$5,550,000, will operate daily mail and passenger service

to London, Brussels, Amsterdam, Berlin, Warsaw, Vienna, Budapest, Athens and Constantinople.

AUG. 31.

China-Philippine Route Surveyed

H. M. BIXBY and two companions completed a survey for a projected air service between Shanghai and Manila, via Hongkong. Their flight in an amphibian between the Chinese city and the island capital was said to be the first completed.

SEPT. 4.

Airway Lights On Full-Time

THE THREE principal transcontinental air routes are now being lighted on a full-time schedule following abandonment of part-time operation by Secretary of Commerce Roper. Economy measures were responsible for the curtailment. In addition, the Seattle-Los Angeles route was put on a full-time basis. SEPT. 6.

Holderman Loops Glider 35 Times

RUSSELL HOLDERMAN, manager of the D-W airport, Leroy, N. Y., looped his glider 35 consecutive times to break the previous record, 17 loops, achieved at the National Air Races in Chicago in July. An unofficial

attempt by Holderman previously resulted in 37 loops. SEPT. 17.

Navy Demands Carrier Planes

ADMIRAL ERNEST J. KING, chief of naval aeronautics, will press the request that Congress appropriate a large amount for aircraft for the new ships. With the *Ranger* going into commission in the spring, 60 planes will be needed to properly outfit it. Admiral King wants 500 more planes and is confident that with no delay in the naval building program the finest equipment and personnel will be provided.

SEPT. 20.

Plan 31 Planes For Coast Guard

IN AN allocation of \$14,800,000 for equipment to combat smuggling, the Coast Guard has provided for the construction of 31 seaplanes, necessary to prevent extensive smuggling, theft of motor boats and other property. Seaplanes will also be provided for on the new revenue cutters, two of which are to be built as part of a building program of eight.

SEPT. 21.

Poles Win Bennett Race

OFFICIAL CALIBRATION of barographs and checking of

landing certificates resulted in awarding the James Gordon Bennett Trophy to Capt. Franciszek Hynek and Lieut. Zbigniew Burzynsky, Polish team which landed its balloon 846 miles from Chicago, the starting point. Lieut. Comdr. Settle and Lieut. Kendall, of the United States Navy placed second with a distance of 776 miles. SEPT. 21.

Dupont Sets Glider Mark

A NEW American glider mark was established by Richard C. duPont who flew 122½ miles in a *Bowlus Sailplane*. This American mark is about ten miles short of the international record.

SEPT. 21.

Colonel Young Honored by Italy

THE ORDER of the Crown of Italy was bestowed on Col. Clarence M. Young in the Italian Embassy at Washington for his services as an Army aviator on the Italian front during the War, for his notable contributions to the development of world aviation as former Assistant Secretary of Commerce for Aeronautics and for his aid in preliminary arrangements for the flight of General Balbo to this country. SEPT. 23



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Every step in Boeing training HAS BEEN PROVEN

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For Boeing instruction has a broad background of pioneering experience on the mid-continent, coast-to-coast, and other routes. Its methods are in keeping with the high efficiency standards of the Boeing, Sikorsky, Vought and Stearman airplane plants; Hamilton Standard propeller, and Pratt & Whitney, the engine manufacturers—all affiliates of Boeing School.

Flying equipment and flying habits that will not "hold up" are outlawed here. The most thorough ground courses in America begin your instruction, and veteran pilots with an average of 6,000 hours in the air are your flying instructors.

Ask any Boeing graduate. Or, for full details regarding the variety of courses, their composition, costs, enrollment requirements, etc., mail the coupon below. Choose the flying training that will mean the *most* when you graduate.

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FOREIGN NEWS IN BRIEF

Australasia

A De Havilland Dragon Moth, twin-engine eight-passenger cabin biplane, was delivered recently to West Australian Airways, Ltd., for use over the company's Perth-Wyndham service. The new plane is expected to increase speeds over the route where the demand for fast and regular service is reported as consistently good.

EIGHT CADETS and two naval officers have been added to the pilot training school of the Royal Australian Air Force. This is the first group of new pilots for some time. In addition, Air Force authorities have been notified that funds are available for new equipment and it is expected that 18 planes, capable of speeds in excess of 200 miles an hour, will be purchased.

WING COMMANDER WACKETT, of the Cockatoo Island aircraft factory, is supervising construction of a twin-engine monoplane along Fokker principles for Charles Kingsford-Smith, who purposes to fly the *Southern Cross* accompanied by the new plane to New Zealand at a future date. Wackett is reported as favorably inclined toward American aircraft engines of large horsepower for importation to Australia for its aircraft needs.

Canada

Three planes of the Toronto Flying Club recently made a 2000-mile good-will flight from Toronto via Montreal and Quebec to the Maritime Provinces. They carried invitations to participate in the centenary celebrations in the city of Toronto in 1934.

ROYAL CANADIAN Air Force and

U. S. Air Corps planes participated in an air pageant sponsored by the Toronto Flying Club on September 9.

THE ANNUAL SUMMER fishery patrol of British Columbia salmon fisheries was accomplished by plane this year. Use of the airplane has saved inspectors much time by allowing them to visit lakes and rivers which otherwise were practically inaccessible.

Central America

The Nicaraguan Government has made a three-year contract with an Italian company to provide for air mail and passenger service to all cities where flying fields are located.

Czechoslovakia

Thirty-five Diesel aircraft engines have been ordered by the Czechoslovakian Government from A. S. Walter of Prague-Jinonice. The engines, which will be built under an American license, are to be delivered before the close of 1933.

THE AIR MINISTER has appointed an independent committee to consider a system of control of private flying. Lord Gorell, who is also chairman of the Royal Aero Club, is chairman of the committee.

A COMPLETELY EQUIPPED plant for the manufacturing and repairing of planes has been established for the Zlin branch of the Masaryk Aviation League as a gift from a Czechoslovakian shoe manufacturing concern. The aeronautical manufacturing program provides for the construction of 100 small planes for training civilian pilots. It is anticipated that 5000 pilots will receive training within the next five years.

France

Societe Aeronautique Francaise recently produced an all-metal monocoque construction monoplane known as the Dewoitine D 332. The plane has accommodations for 8 passengers, 2 pilots and freight. It is understood it will be used in the Indo-China service. Powered by three Hispano-Suiza engines of 575-horsepower each, the plane is reported as having a high speed of 186 miles an hour and a cruising speed of 155 miles an hour.

AIR MAIL CARRIED by Aeropostale planes between South America and France shows favorable increases, according to figures recently received. From 299 pounds in 1928, air mail poundage increased to 2,447 pounds in 1932.

PARIS AND BIARRITZ are now being served by the newly organized Societe de Transports Aeriens Francais, an unsubsidized company having its offices in Paris. Service is offered every day except Sunday.

THE SECOND RACE for the Deutsche de la Meurthe Cup will take place under the auspices of the Aero Club of France May 27, 1934, in the Beauce section of northern France. As in the 1933 race, competing planes will be limited to a maximum engine cylinder capacity of eight liters, and a minimum speed of 250 kilometers per hour over a 500-kilometer course will also be required. In addition to winning the cup for the national aeronautical group of his country, the pilot placing first in the race will be awarded a sum of 100,000 francs. Entries will be received by the Aero Club of France until October 31, and with an extra fee, until March 15, 1934.

Germany

New markings for German aircraft will include, in addition to the national letter "D," the swastika flag and the black, white and red flag. These flags will be painted on the tail surfaces of heavier-than-air craft and on the fins of airships.

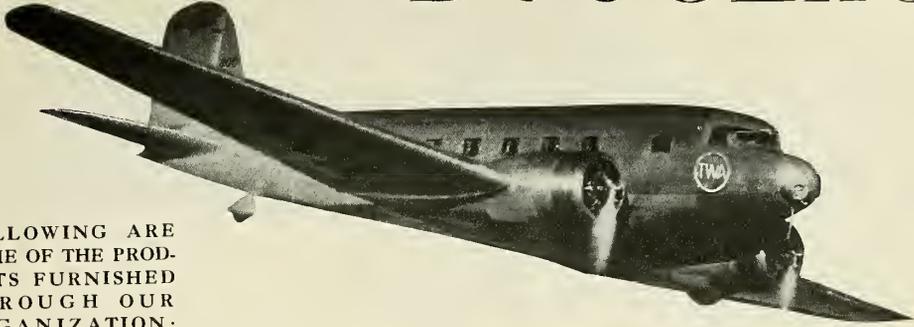
A BRONZE TABLET commemorating the flight of the late Baron Gunther von Huenefeld, who together with Capt. Hermann Koehl and Maj. James C. Fitzmaurice made an east-to-west flight across the Atlantic in 1928, and Floyd Bennett, the American aviator who died of pneumonia as a result of his heroic effort to succor the fliers when they were forced down on Greeneley Island, was unveiled recently in Bremen. The tablet, a gift of the North German Lloyd, has been placed in the Bremen city hall.

(Continued on following page)



Wright Cyclone-powered Fokker for Royal Dutch Airlines

SERVING DOUGLAS



FOLLOWING ARE SOME OF THE PRODUCTS FURNISHED THROUGH OUR ORGANIZATION:

- Hamilton-Standard Controllable Pitch Props
- Bendix Wheels and Brakes
- Eclipse Starters, Generators and Vacuum Pumps
- Berry Brothers Interior Finishes
- Seapak Sound and Temperature Insulation
- Elgin Electrically Operated Landing Flares
- Packard Lighting and Ignition Cable

QUICK shipments were a great aid to the Douglas Aircraft Company when they began construction on T.W.A.'s new airliners. That was "right up P.A.C.'s alley"—for, as western representatives of many aeronautical products, we are equipped to serve aviation in the west on a moment's notice. When these new transports go into service, this organization will watch their flights with a feeling of justifiable pride—knowing that satisfaction was experienced all around.

PACIFIC AIRMOTIVE CORPORATION, LTD.

- | | | | | |
|---------------------|---|------------|---|------------|
| United Airport | • | Burbank | • | California |
| Oakland Airport | • | Oakland | • | California |
| Los Angeles Airport | • | Ingleswood | • | California |

A SATISFIED ADVERTISER WRITES:

"... Want to express our appreciation and complete satisfaction with results obtained from our advertisement. ... Have had replies from practically every state, Canadian Provinces, Mexico, etc. ... It is amazing the breadth of field your publication covers and the fine class of people it reaches, all over. ... If there is any truth in the old saying that 'a man is judged by the

company he keeps' then I am well content to 'keep company' with AERO DIGEST, in any advertising I want to put before the air industry, in all its branches."

AND ANOTHER—

"... Wish to tell you of the fine results we have obtained through AERO DIGEST. ... Have received numer-

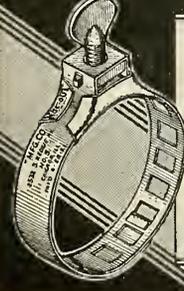
ous replies from all over the U. S. and from foreign countries. ... Pleasantly surprised to find large foreign circulation your magazine has."

AND ANOTHER—

"... Just completed schedule of full page ads for AERO DIGEST. ... Cancelling our advertising in other aeronautical magazines."

NOTHING convinces like ACTUAL RESULTS

NOC-OUT *The HOSE CLAMP* with the Thumb Screw



Rust Proof, trouble proof, and a tight connection all the time.

The Standard Equipment Hose Clamp of the Airplane and Automotive Industry.

For Aircraft Specify No. 745
Carried by Dealers Everywhere
WITTEK MFG. CO.
4300 W. 24th Place Chicago

"I attribute my success to the high class training received at Lincoln"

LINCOLN Graduates Get the Best Jobs!



Lincoln training opens the way to the big pay jobs in aviation. Here's proof in this letter:

Government Approved School. Unexcelled equipment. Training by Government Licensed Instructors. including blind flying, cross country, aerobatics, master mechanics, airplane and engine course. Now is the time to start training. Exceptional opportunities in both Central and South America as well as in U. S. Aviation courses taught in either English or Spanish. Write! State your age.

"I immediately secured a position with the Council Bluffs, Iowa, Airways. Later I was fortunate in securing a position with the Chicago Tribune delivering their newspapers to Minneapolis by air. I attribute my success to the high class training received in your school. I am firmly convinced that aviation holds a wonderful future to the young man who secures high class training such as he can get in your school.—Morris Cooper.

LINCOLN AIRPLANE & FLYING SCHOOL, 308c Aircraft Bldg., Lincoln, Neb.

Great Britain

Eleven air routes are now operating in Great Britain, not including those plying between London and the Continent. The opening of the London-Plymouth service probably brings to a close inauguration of new services for the remainder of the year, but with the coming of the spring and summer of 1934, it is understood that 9 or 10 additional lines^f are planned. These include long-distance lines between London, Newcastle and Edinburgh and between Inverness, Ullapool and Stornaway in the far north.

The new Plymouth-London service is flown by Monospar cabin monoplanes which negotiate the 185 miles between the two cities in two hours, including stop-overs at Portsmouth and Southampton.

THREE HUNDRED Avro "Tutor" planes have been ordered as standard training equipment of the Royal Air Force. The Tutor is a two-seater biplane, carrying the full instrumental and control equipment needed for the training of military pilots. It is powered with an Armstrong Siddeley Lynx 215-horsepower engine. Cruising speed is 95 miles per hour, with a maximum speed of 115 miles per hour, and the service ceiling is 15,000 feet. Many aerobatic evolutions are within the powers of the Tutor. In terminal velocity dives it reaches a speed of nearly 300 miles an hour without vibration or unsteadiness. With slight changes in the engine installation to permit satisfactory running with the machine upside down, it is fit for inverted flying, several British pilots having made inverted flights lasting for twelve minutes in Tutor planes.

AN AIRLINE has been established between Glasgow, Scotland, and Belfast, Ireland, by the Midland and Scottish Air Ferries, Ltd. Flights are made in landplanes twice daily in each direction, the time required being 1½ hours.

JAMES MOLLISON'S new de Havilland "Dragon" biplane will have the same engines and gas tanks as the *Seafarer* which came to grief at Bridgeport. The *Seafarer II* is to be slightly modified to take the large fuel and oil tanks necessary for a flight of 6000 or more miles



New fast Junkers JU-60, a 10-place all-metal monoplane powered by a P. & W. Hornet. It has a top speed of 174 m.p.h.

and will be cleaned up externally, giving it a cruising speed 5 miles per hour in excess of the original plane.

TRAINING PLANES of the Air Service Training School flew 1046 hours during the month of August, making this month one of the busiest ever experienced. Ground instruction, it is reported, has been equally active.

SIX NEW FIELDS have been added to the Automotive Association's list of landing fields. These include sites at Castle Douglas, Otterburg Hall, near Cramlington, Douglas, Hatherley and Chalvey.

SIR CHARLES KINGSFORD-SMITH has secured the agency for the Percival Gull airplane, an Australian-designed, but English-built, low-wing cabin monoplane. A Percival Gull airplane has been purchased by D. Mackay, to be flown to Central Australia on an aerial survey of unmapped country.

CAPT. F. HAIG, chief aviation officer of the Vacuum Oil Co., has been elected a full member of the Royal Aeronautical Society, London. The award was made to Captain Haig for his efforts to foster aviation in Australia.

Holland

Changes in the new Fokker XX, described in the February, 1933, issue of AERO DIGEST, have given the transport increased speed. With lengthening of the nacelles and changes in the retractable landing gear, about five miles an hour have been added to its speed. The transport is powered by three Wright Cyclone engines, and with full

load including 12-20 passengers and baggage, it will be capable of a top speed of 186 miles an hour and a cruising speed of 155 miles an hour.

A number of planes of this type has been ordered by K. L. M., the Royal Dutch Airlines.

Russia

It is reported that four million rubles have been appropriated for a fleet of air ambulances and flying hospitals for use by the Commissariat of Health. Construction of the planes, it is understood, will be undertaken immediately.

South America

The Brazilian Ministry of Marine in announcing plans for the extension of its air services revealed that it is planning two air mail routes, one of which would extend from Manaus to Para. The other is to connect the Tocantins River district with Minas Geraes State and Rio de Janeiro.

A NEW AIRPORT is to be constructed on a 247-acre site in the Pauji section of Puerto Cumarebo, State of Falcon. The land was recently set aside for airport purposes by the President of Venezuela.

UNDER a contract negotiated between the Argentine Government and the French Aeropostale Co., air service is extended to Magellanes and southern regions of Argentina. In return the Government gives the airline a monthly subsidy of 15,000 pesos and supplies all necessary fuel.

STANAVO



AVIATION GASOLINE
AVIATION ENGINE OIL
ROCKER ARM GREASE

And now **WACO** installs **SWITLIK** CHAIR-CHUTES



Switlik Chair Chutes installed in one of the new WACO cabin ships—beautifully upholstered to match the fine appointments of the cabin interior.

WACO cabin ships now provided with SWITLIK chair chute protection

THE name WACO stands for advanced airplane design, for sturdy construction that gives the stamina for which these ships are famous—and for cabin appointments outstanding in beauty and convenience. The new enclosed ship is a worthy addition to the Waco family—and it is a tribute to Waco's regard for owner's safety that Switlik Chair Packs are selected to provide parachute protection.

Switlik Chair Chutes may be installed in any type cabin ship—new or old. They are light but strong, comfortable, surprisingly economical to install, instantly ready in case of emergency. Switlik Chair Chutes are the only safety device of their kind, approved and used by the Department of Commerce. Just tell us the kind of ship you own and we'll send you complete information and installation estimate.

SWITLIK PARACHUTE & EQUIPMENT CO., TRENTON, N. J.



SWITLIK
SAFETY CHUTE



A new thrill for Sophisticated Flyers

● If you're an old-timer at flying, the sleek, streamlined fuselage of this new WACO Model C for 1933 will give you a thrill you probably never expected to have again.

If you're new at the game, you'll get a certain solid satisfaction from the beautiful way this ship handles in the air and its ability to get in and out of tight places.

Here, for quick reading, are some of the "high spots." Luxurious, form-fitting seats. Better vision from both



WACO AIRCRAFT CO., TROY, OHIO, U. S. A.



"Ask any pilot"

WACO LEADS IN AIRCRAFT REGISTRATIONS

front and rear windows. Controlled interior ventilation. A cruising speed of 125 miles an hour, with 145 an hour top speed if you want it.

Thus America's favorite ship (according to registration figures) demonstrates its right to hold first place again in 1933.

See this wonder ship the first chance you get. Or write for facts and figures. They will be sent free and postage paid without the slightest obligation on your part.

Member Aeronautical Chamber of Commerce



Manufacturer of Progressive Aircraft Finishes

VISIT Berry Brothers Exhibit
in the Aviation Building
THE CENTURY OF PROGRESS
at Chicago—Don't fail to see this unusual display of color

BERRY BROTHERS

PAINTS • VARNISHES • ENAMELS • LACQUERS
DETROIT, MICHIGAN WALKERVILLE, ONTARIO

ROOSEVELT TRAINING QUALIFIES WINNERS!

AT THE TORONTO FLYING CLUB AIR MEET last Labor Day Week-End, here's the record: Charles May, Harold Zeller and Ray Cullman went . . . part of Regular Training . . . May, a Roosevelt Transport student, flew to Toronto and back, solo. He won the Royal York Trophy. He has completed the mechanics course, is working for Amphibious, Inc., at Roosevelt Field, Inc., while he completes his Transport Course. Zeller, Roosevelt student in the Master

Mechanics and Transport Courses, flew with Instructor Cullman, but handled the stick cross-country to Toronto and back. He won First Prize and trophy for best maintained American Ship. Let Roosevelt Field's experts train you in all branches of Flight training, Pilot, Ground and Mechanics courses. Roosevelt School maintains complete facilities, equipment, etc., for teaching every branch of Flying and Mechanics. Write for complete information, stating the course most interesting to you. Ask for Booklet (Y).

ROOSEVELT AVIATION SCHOOL, Inc.

318 WEST 57th STREET, NEW YORK, AND MINEOLA, LONG ISLAND

THE AIR RACES

(Continued from page 17)

other ship having much opportunity to pass it. We'll see but little racing competition, with stiff fights for places, until there are several of each type produced. The old Monocoupe races, with Livingston, Roberts, Quimby, and others battling for position were infinitely more exciting, even though the speeds were much lower.

The final event, the Frank Phillips Trophy race, was a sad disappointment, with three ships forced out, one crash in which my dear friend Florence Klingensmith was killed, and with only three planes finishing the race. J. R. Wedell, making an average of 245.95 m.p.h. in the Wedell-Williams with Wasp Sr. flew a perfect race to win first place; Lee Gehlbach came in second in a Wedell-Williams with Wasp Jr., averaging 217.48; and that swell racing pilot, Roy Minor, flew the Howard with the Menasco B6 engine at an average of 215.15 m.p.h. It was a treat to watch Minor take the turns.

The show part of the meet was grand, from the U. S. Marine Corps maneuvers to the parachute jumps. The Phillips "66" Hollywood Trio, Frank Clark, Howard Batt, and Paul Mantz, was sensational; Major Ernst Udet did his usual perfect stunts; Lieut. Tito Falconi performed his fine acrobatics, and Johnny Miller looped an autogyro, which is a weird stunt to watch. H. E. "Spud" Manning made his last thrilling delayed parachute jump, and flew off next day to meet death by drowning in Lake Michigan, a bitterly ironical end for a daring young man who had faced so many greater dangers and survived them. When will pilots learn that land planes are designed to alight on land, not on water, unless floats are used?

I feel impelled to say a word for the Granville Aircraft Corporation, builders of the Gee Bee in which Florence Klingensmith dived to her death after some two square feet of fabric had torn from the right wing close to the fuselage, although the ship was still flyable unless the fabric jammed the controls. Possibly some blame the Granvilles; but they merit no blame. The ship was built on contract for the Cord Corporation in 1930 to get the best possible performance with a Lycoming motor. Therefore it was designed for a maximum horsepower of 240 and a maximum speed of 200 m.p.h. The Granville brothers had never seen the ship from the day it left the factory three years ago until it arrived at Chicago for the race, powered with a speeded-up Wright Whirlwind delivering between 500 and 600 horsepower—in a ship designed for a maximum of 240 horsepower! It seems to me that there should

be some control by the Department of Commerce to insure that there be a safe and sane relationship between a plane's original design and the horsepower that is put in it by experimenters whose motto must be "In God we trust."

I hesitate to advocate too much governmental control of experimental racing designs, lest it hamper development. Naturally government officials will protect themselves by insisting on safety factors to the limit, thus cutting down performance. But as speeds increase, as more and more designers and builders try out new ideas, I feel that some knowing restraining hand will be desirable. After all, wings tearing from ships, as happened in the Cessna racer with Roy Liggett hurtling to the earth, are hard to excuse. Admitted, such a ship is experimental, not a tested commercial product; but the strength of all materials should be known, also the stresses to be endured at high speeds. If the ship will not stand those strains, if the cowling is weak enough to tear off (as it did, according to Clyde Cessna whom I asked about it), then that should be known by engineers before the ship takes to the air. I feel that too much is left for the pilot to find out, to his cost. It is possible to pay too high a price for speed. I would welcome suggestions from racing pilots and the designers and builders of planes.

YOU CAN SELL IT . . .

(Continued from page 24)

pect tips that gravitate to the airport manager; augmenting sales promotion appropriations for private planes out of part of the profits accruing from military and transport sales; re-selling owners by dropping hangar rentals to \$25 and scaling down service and supply charges; the unaccounted for absence of airplanes at business equipment shows; wondering why the radio advertiser who gives away automobiles has never been sold the idea of giving away planes, or at least courses in flying instruction—there would be many takers and much publicity; the frenzied organization of distribution soon to be faced by liquor houses and their need for planes; the crowded inter-city schedules of radio broadcasters; the possibilities of air tours organized like steamship tours with tourist camps located at airports; the astuteness of the dealer who takes up wives and mothers of prospects to demonstrate the safety of the thing; selling national advertisers in other fields on the showmanship of getting planes into their advertisements; Howard Ailor's NRA appeal to buy a plane and put 4,000 man hours to work; the incident of the sick boy who was rushed home by chartered plane from the Adirondack camp and the subsequent sale of a plane to his parents, demonstrating the susceptibility

to sales of those to whom aviation becomes a *realism*.

Plenty of airplanes will be sold next year. Weekends under the NRA will be longer, more people will fly. Inexpensive craft are being planned and from Germany comes the report of a \$714 airplane. Plane ownership must be brought to the fore in the consciousness of the public mind. A survey recently carried out by the A. C. Neilson Co., revealed that the average executive greatly *overestimates* the percentage of prospects who (a) have heard of his product, (b) understand its virtues, (c) believe the claims made for it; he *underestimates* the opportunity for creating new business and thinks his product suffers a good deal more from price resistance than it does.

Let us no longer be content to leave the progress of the industry to the chance of circumstances or the wits of struggling salesmen. With *organized* sales promotion after the pattern of all successful business we will reap the full benefits of the undoubtedly great opportunities that lie immediately ahead.

Wish we could forget that story told by Frank C. about the friendly stranger in the "speak," the commiseration over business, the hush of sympathy accompanied by a cheque in full for an airplane. Much to Frank's surprise the next day the sale stuck and the cheque was good. Shucks, there's a sale without a single moral.

FUR COMFORT

AT LOW COST



These Garments are the best value I have ever seen for warmth and comfort. I recommend them.

Clayton Chamberlain

AVIATOR'S SUIT

No. 1—(Illustrated)



Just right for Duck Hunting, Fishing, etc. Tan Gabardine 100% waterproof. Genuine glazed Manchurian fur lining throughout. Beautiful fur collar. Perfect comfort at any temperature.

Sizes 36 to 42

Guaranteed Cost to
U. S. Government

\$78

OUR PRICE **14.95**

NO. 1A AVIATOR'S SUIT **\$18.95**
Same as above with best rust-proof "Hookless Talon" Zippers.

LEATHERTEX AVIATOR'S SUIT
U. S. Navy surplus. Suede cloth lining, waterproof zippered body and legs. Warm and comfortable. Sizes 36 to 48. **\$8.75**

MONEY BACK GUARANTEE
If in 5 days you are not entirely satisfied with any garment, we will refund your money.

Send 25¢ with Order. Balance C.O.D.

Send for illustrated free catalogue; complete line of outdoor clothing, made-to-order clothing, sporting goods, gifts and hundreds of other bargains.

GOVERNMENT SURPLUS CORP.
89 Greenpoint Ave. Brooklyn, N. Y.
Dept. L-1 Agents Wanted Everywhere

A.T.C.NO.20 APPROVES THE NEW MODEL "B" POSITION LIGHT

● This light conforms to the very latest Department of Commerce specifications, and at the time of preparing this advertisement no other position light has received an A.T.C. We take pleasure in again best serving the aeronautical trade by presenting the first APPROVED POSITION LIGHT which is now being distributed EXCLUSIVELY by our company.

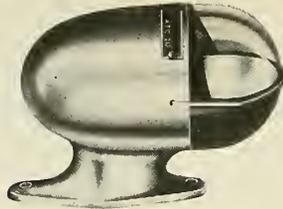


Illustration One-Half Actual Size

● **DISTINCTIVE FEATURES:** Strong and compact, high visibility, highly polished one-piece aluminum shell and base combined, weight per set of three approximately one pound, 15 C. P. lamps make it feasible to use dry cell batteries in planes not equipped with storage batteries, moderately priced.

PER SET OF 3 ONLY \$9.00

3769 S. Broadway Place
Los Angeles, Calif.

NICHOLAS-BEAZLEY AIRPLANE CO. INC.
MARSHALL, MISSOURI

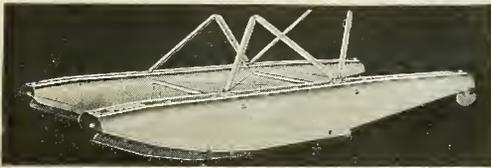
Floyd Bennett Field
Brooklyn, New York

MAKE YOUR PLANE



A SEAPLANE WITH EDO FLOATS

Going hunting this Fall? No bay, inlet or inland fastness is forbidden to the owner of an Edo-equipped plane. With Edo Float installation, interchangeable at will with wheel landing gear, swift transportation to hunting lodge or duck blind is readily available. For details address EDO Aircraft Corporation, 610 Second Street, College Point, L. I., N. Y.



COLUMBIA "TECH"

Now Offers Its Resident Courses for

HOME-STUDY

NO EDUCATIONAL REQUIREMENTS TO ENROLL

Recognized for 23 Years

EQUIPMENT AND TEXTS FURNISHED WITHOUT CHARGE

Courses Completed in One Year or Less

FREE EMPLOYMENT SERVICE—ALSO LOCAL CLASSES

COLUMBIA TECHNICAL SCHOOLS

Box AD1033, 1319 F St., N.W., Washington, D. C.

Without cost or obligation please send me information on course checked below:

- | | |
|--|---|
| <input type="checkbox"/> Airplane Design | <input type="checkbox"/> Aircraft Drafting |
| <input type="checkbox"/> Aerodynamics | <input type="checkbox"/> Airplane Mechanic |
| <input type="checkbox"/> Stress Analysis | <input type="checkbox"/> Aircraft Engines |
| <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Aviation Ground Course |
| <input type="checkbox"/> Aerial Navigation | <input type="checkbox"/> Aircraft Blueprint Reading |

Name Age

Address

Occupation

This School Does Not Employ Salesmen to Annoy You!

EXPERIENCED AIR LINE PILOTS AVAILABLE

● Due to reduced schedules and general curtailment brought about by the depression, there are a limited number of highly qualified line pilots available, with practical experience in all weather, day and night flying.

These men prefer line positions but will be interested in any good flying job. Capable of handling positions as operations managers, field managers and other positions requiring executive as well as flying ability.

Whether in air line operations, private or other commercial flying, the best investment is a good pilot.

●
For full particulars

Communicate with Air Line Pilots Association, 3145 West 63rd Street, Chicago, Ill.,

THE MOST IMPORTANT AERONAUTICAL PEOPLE READ AERO DIGEST

Many read THE SPORTSMAN PILOT, too

Because AERO DIGEST is complete, up-to-date and correct in the material it publishes, the industry depends on it for aviation news, developments—in fact, for everything pertaining to aeronautics. It is because of their preference that more people read AERO DIGEST than any other aeronautical publication.

They like THE SPORTSMAN PILOT, too, because it is so different. It is not a technical publication, but serves instead as the representative magazine of sport flying. You can subscribe to both magazines at the combination price of only \$5 for one year of each.

..... AERO DIGEST • 515 MADISON

..... AVENUE • NEW YORK • N. Y.

Please check your choice in the squares provided for this purpose.

Enclosed is \$5. Send me the DIGEST and the PILOT for one year.

Enclosed is \$5. Send me the DIGEST for two years.

Enclosed is \$3. Send me the DIGEST for one year. Enclosed is \$3. Send me the PILOT for one year.

Name

City and State

Address

Occupation

ADVERTISERS' LITERATURE

THIS service is for the convenience of those who are in the market for any of the products or facilities advertised in this issue. Read carefully the advertising of the items listed below in which you are interested, to determine whether the information offered is what you need. When filling out the coupon be sure to mention the company with which you are associated, and your position.

AIRCRAFT

- Boeing literature concerning the "247" is available to airline operators and other users of large aircraft. (Page 27)
- Commercial operators—when writing for Douglas' catalog, please clip the coupon to your letterhead. (Page 9)
- Potential owners of a four place cabin plane are invited to write for details of the Stinson "Reliant." (Page 65)
- Waco has an interesting booklet completely describing, for potential aircraft owners, the three popular Waco models for 1933. (Page 61)
- General Aviation manufactures a wide line of military and transport aircraft for the domestic and export markets. (Page 4)
- Commercial operators and private fliers will be interested in the possibilities of the Fairchild 22 and 24. (Page 65)
- The Vought "Corsair," popular navy plane, also is adaptable to sport flying. (Page 37)

ENGINES

- Pratt & Whitney's booklet describes for engineers, aircraft builders and operators, the salient points of "Wasp" and "Hornet" engines. (Back Cover)
- Airlines, commercial operators and engineers are invited to write for the literature describing Wright liquid- and air-cooled engines. (Page 1)

EQUIPMENT

- For aircraft finishing information, see Berry Bros.' catalog of colors and finishing suggestions. (Page 61)

- Dealers and all users of aircraft are invited to send for literature concerning B.G. Spark Plugs. (Page 2)
- Valves—for new engines or for replacements—are described in the Thompson literature for engine builders and repair stations. (Third Cover)
- Repair stations and aircraft and engine builders—write for Wittek's literature on "the hose clamp with the thumb screw." (Page 59)
- Literature concerning Breeze Radio Shielding and other aircraft products is available to engineers, manufacturers and operators. (Page 8)

- Engineers, manufacturers and operators are invited to write for information concerning the Smith Controllable Pitch Propellers. (Page 5)
- Aircraft operators, pilots, dealers, builders—Good-year offers you an interesting catalog concerning the Airwheel. (Page 23)
- If you are in the market for steel propellers, including controllable pitch, write for Hamilton Standard's descriptive literature. (Page 25)
- National Tube offers to aircraft manufacturers complete literature covering various types of aircraft tubing. (Second Cover)

19. Plane owners—write for the complete description of the new D. of C. approved Nicholas-Beazley position lights. (Page 63)

20. Pacific Airmotive, large west coast distributor of aircraft products, will gladly send operators and manufacturers in the west literature concerning their full line. (Page 59)

21. Aircraft manufacturers, operators, dealers and pilots—if you're buying aircraft instruments, get Pioneer's illustrated catalog. (Page 29)

22. Engine manufacturers and operators, write for descriptions and prices of Romec aircraft pumps. (Page 10)

23. Aircraft manufacturers will be interested in the Switlik Parachute literature, describing Switlik Chutes for cabin planes. (Page 61)

24. American Sheet & Tin Plate's literature contains interesting data for those who plan the construction of hangars, shops, sheds, culverts, etc. (Page 57)

MISCELLANEOUS

- If you're thinking of buying an aircraft radio, write for the Westport booklet. (Page 56)
- Ronald Press Company offers a plan regarding the purchase of their technical books on deferred payments. (Page 72)
- The Air Line Pilots Association has on file a list of experienced line pilots available for positions. Aircraft operators, please write. (Page 63)
- Air race and contest officials will find "Johnny" Miller's looping autogiro a big attraction. Full details are readily available. (Page 57)

29. The Gov't Surplus Company's catalog contains descriptions of a complete line of flying clothes. (Page 62)

SCHOOLS

- For expert ground or flight training, write for the Boeing School literature. (Page 57)
- Prospective students, write for the Dallas School catalog and schedule of low prices. (Page 7)
- Training at San Diego is described in the Ryan School of Aeronautics literature. (Page 51)
- The Spartan School's booklet describes the thrilling student flights during the tours of "The Dawn Patrol." (Page 11)
- Tri-State College offers literature outlining its two-year course in aeronautical engineering. (Page 66)
- The Lincoln School invites you to write for their catalog of ground and flying courses. (Page 59)
- The Penn School of Aviation invites pilots- and mechanics-to-be to write for their catalog of courses and tuition. (Page 55)
- The Roosevelt School's literature describes fully all flight and ground courses, for prospective students. (Page 61)
- Students interested in home study aviation courses are invited to write for the Columbia "Tech" catalogue. (Page 63)
- Prospective students—write for a copy of "Skyward Ho," describing all aviation courses taught by Parks Air College. (Page 49)

EACH COUPON MUST BE ACCOMPANIED BY 3c IN STAMPS

IMPORTANT

THOSE desiring aircraft manufacturers' literature are requested to tell whether they are interested from the standpoint of commercial operator, business man or sportsman pilot. For school literature, be sure to state whether you are interested in flying or ground courses. Use the margin below the coupon to supply this information.

AERO DIGEST • 515 MADISON AVE. • NEW YORK • N. Y.

Please have sent to me the literature indicated here.

CHECK HERE: Name
 No. Position
 No. Company
 No. Address
 No. City and State

A NEW ISSUE OF STINSON PLANE TALK

(September)



Tells all about the
STINSON "RELIANT"
which is out-selling all
two, four and six pas-
senger cabin planes
combined and other
timely facts about new
model and prices.
Mailed free . . . postpaid

STINSON AIRCRAFT CORPORATION

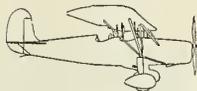
DEPT. SR

Wayne, Michigan

Division of Cord Corporation

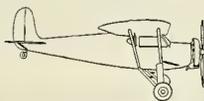
Simplicity and Strength FOR TRAINING

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AERONAUTICAL INDUSTRY

(Continued from page 56)

Fast Planes Under Special Rule

SPECIAL INDIVIDUAL rulings as to airworthiness will govern manufacture of aircraft built to fly 150 or more miles an hour, according to Eugene Vidal, Director of Aeronautics.

These individual rulings will be effective until July 1, 1934 when a complete revision of the Airworthiness Requirements will be made.

The new regulations were scheduled for promulgation January 1, but at the request of some manufacturers, the revision will not become effective until July 1.

Lindberghs In Russia

COLONEL and Mrs. Charles A. Lindbergh flew to Russia from Finland and after a short stay at Leningrad continued on to Moscow where they were greeted by high officials, civil aircraft representatives and members of the domestic and foreign press.

The flight of the Lindbergh's to Russia is felt to be the forerunner of friendlier relations between this country and the Soviet Government and the removal of any barriers which might hinder opening of negotiations for the sale of American

aircraft in Russia. The flier himself predicted that a northern air route over the Atlantic, linking America and Europe will be in operation on a commercial basis within a few years.

A. S. T. M. Election Results

PROF. T. R. LAWSON, head of the civil engineering department, Rensselaer Polytechnic Institute, has succeeded Cloyd M. Chapman, consulting engineer, as president of the American Society for Testing Materials. Hermann von Schrenk has been elected vice president to serve with W. H. Bassett, who was elected for a two-year term last year.

Arkansas Eliminates Gas Tax

TAKING ADVANTAGE of a special session of the Arkansas Legislature, called to enact a beer measure, a committee from the Little Rock Chapter of the National Aeronautic Association was successful in having the Governor of the state include a bill which provided for the elimination of the six-cent tax on aviation gasoline. Prior to the passage of the law, purchasers of gas were required to pay the six-cent state tax and then apply for a refund.

On the committee were Felix G. Smart of Pine Bluff, Ellis M. Fagan, W. F. Moody, Wm. D. Hopson and Charles M. Taylor, all of Little Rock.

Turner Sets Transcontinental Mark

MAINTAINING AN average speed of more than 250 miles an hour, Col. Roscoe Turner clipped 13 minutes, 30 seconds from the mark made by Jimmy Wedell to set a new transcontinental record of 10 hours, 5 minutes and 30 seconds. Turner flew the P. & W. Wasp-powered "Ring Free" monoplane from Los Angeles to Floyd Bennett Airport in New York through unfavorable weather conditions which at times forced him to seek the higher altitudes. Other times tail winds helped increase his speeds to 300 miles an hour.

Computing the delays for refueling, Turner's flying time for the 2,520-mile flight was 9 hours and 50 minutes, or an average of more than 270 miles an hour.

Naval Officer Takes Boeing Post

LIEUT. WARD C. GILBERT has taken over his duties as inspector of Naval aircraft at the Boeing Airplane Co., Seattle, Wash., succeeding Lieut. John Perry, who has been transferred to the post of flag secretary to Admiral A. W. Johnson, Aircraft Fleet, Base Force. Prior to his new assignment, Lieutenant Gilbert served for two years aboard the aircraft carrier *Lexington* as aviation repair officer.

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FOR SALE: Waco 10, late 90 type with new wing panels over year ago; equipped with brand new OX-5 motor with less than 50 hours. Fine shape. \$550. S. O. Hugelen, Leland, Iowa.

FOR SALE: Three-place Curtiss Rohin, with Challenger 185 horsepower motor. Fine condition. Refinished. C. G. Taylor, Taylor Aircraft Company, Bradford, Pennsylvania.

WACO 10: Licensed April 1934. Air wheels, turn and bank indicator, booster starter, navigation lights; excellent condition. \$500. Located Long Island. AERO DIGEST, Box 1627.

FOR SALE: Avro-Avian with slots, air wheels, just repainted and overhauled; Cirrus Mark III motor, 130 hours since new. Licensed until July, 1934. Price \$450. George Schaaf, Greenridge, Staten Island, New York.

FOR SALE: Two J-5 Travel Airs, excellent condition; fully equipped, NC licensed and priced to sell. Will accept good late model car on deal. Terms to responsible buyers. P. O. Box 250, Jackson, Michigan.

ROBIN: Challenger 185 h.p. Steel prop. A-1 condition. Wings international orange. Fuselage black, striped in orange. Never cracked. 195 hours, 11 hours since overhaul. Licensed and ready to go. \$850. Ryan Speedster, 3 polh., Axelson 150 h.p., \$750. Bald Eagle Airways, Lock Haven, Pa.

TRAVEL AIR 6000: J6 engine, 300 h.p. Motor and ship in A-1 condition. 450 hours total on ship; 20 hours since last overhaul. Cash, \$2,500. Edward Block, Jr., 3139-93rd Street, Jackson Heights, New York.

DH GIPSY MOTH: Splendid condition, air wheels, licensed to January, 1934. Will sacrifice for quick sale. \$650. Hazel D. Wallace, 352 E. Ferry St., Buffalo, New York.

LYCOMING STINSON SM8A: Licensed until September, 1934. 465 hours, 115 since majored. Fuselage and tail surfaces recovered. \$1,600. Will accept trade. Arthur St. John, 502 Schenectady St., Schenectady, New York.

DAVIS MONOPLANE: LeBlond 65, excellent condition, just recently refinished and motor overhauled. 214 hours total. Licensed to May, 1934. \$850. J. M. O'Leary, 122 Dix Avenue, Glens Falls, New York.

HISSO 180 TRAVEL AIR: biplane; steel prop, brakes, duals, full set instruments, licensed until August, 1934. \$500. Russell E. Carnes, 1116 Homcrest Avenue, Kalamazoo, Michigan.

WACO F-2: New Jacobs 170, pants, ring, wing fairing, 160 hours. Factory finish, black and silver. Will guarantee ship throughout. \$2,000. J. McPherson, Abington, Pennsylvania.

LICENSED RYAN B-1: J-5; in excellent shape, with landing lights; for best offer or consider Aeronca with cash in trade. C. Schneider, Muskegon County Airport, Michigan.

J-5 EAGLEROCK: Motor and ship recently overhauled, steel prop, extras, always hangared, licensed to July, 1934. \$1,200, bargain for \$850. Agent, 601 N St., Rock Springs, Wyoming.

FLEET: DeLuxe Model 9, two-place, powered with Kinner 125, delivered new August 1932. Total time to date, 145 hours. In like brand new condition. Equipment: 1 air speed, 1 compass, dual controls, dual brakes, stabilizer adjustable from either cockpit, 40-gallon gas capacity, Heywood air starter, baggage compartment "large," steerable tail wheel, instruments back cockpit, all metal floor, cockpits lined with special leather, parachute seats, army type throttles, navigation lights, special landing gear, cockpit covers, motor covers, semi-air wheels. Color: yellow wings, green fuselage, black cowling and trimming. Cruises: 98; top: 120; 8 gallons gas per hour. Cost new, \$5,600. Sale price, \$1,900 cash. L. R. Saunders, 554 Amherst Street, Buffalo, New York.

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FOR SALE: J-5 Travel Air Speedwing, good condition, \$1,375. Curtiss Junior, few hours, \$450. Great Lakes, motor completely overhauled, \$900. Soo Skyways, Inc., Sioux Falls, South Dakota.

FOR SALE: Straightwing Waco: Wright J6-5; finest open ship in Northwest. Travel Air Cabin 8000B: 6-place, Wright J-5. Perfect condition. Toilet, flares, retractable landing lights. A money maker. Aeronca: Two-place, demonstrator. All three ships are my personal property. Reverend James C. Brown, Wold-Chamberlain Field, Minneapolis, Minnesota.

FOR SALE: Bellanca Pacemaker, \$4,500; Lycoming Stinson, \$2,250; Gipsy Moth, \$1,100; Challenger Robin, \$1,000; Velie Monoprep, \$550; OX-5 Travel Air, \$450. All in excellent condition; many extras. Used parts for all types of planes and motors at 75% discount. Write for particulars. Rapid Air Lines Corporation, Omaha, Nebraska.

FOR SALE OR TRADE: Stinson Sr., 330 h.p., Model SM1F, like new. Stinson Lycoming, in A-1 condition, night flying equipment. Travel Air, J6-5, model E-4000, like new. Cavalier, Lambert R-266, in good condition. Lincoln Page, OX-5, motor and ship like new. Central Air Service, Battle Creek, Michigan.

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STINSON WASP "C": New covering and refinished at factory. 35 hours since factory engine overhaul. Electric starter. New leather seats. Ship and motor perfect. Will take ship in trade. W. Cameron, Pettibone, La Crosse, Wisconsin.

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WASP LAIRD: Verville trainer; Travel Air 6000; Warner Travel Air; Warner Fleet; J-5 Waco; Lockheed Vega, Lockheed Air Express; Lockheed Sirius; Fairchild 22; Fairchild 34; Lambert Monocoupe; OX Bird. Aircraft Sales Company, Hangar D, Roosevelt Field, Mineola, New York.

TRAVEL AIR E-4000 J6-5, new cover, finished in cream and vermilion. Engine just major overhauled. Lights, brakes, new air starter; plenty of instruments. Will trade. Boyers Airport, Melbourne, Kentucky.

COMMAND-AIRE C3C: OX-5; 125 hours, licensed until September 1934; airwheels, rigid landing gear, factory finished orange and aluminum; price \$685. J. H. Council, Lenoir, North Carolina.

SZEKELY MOTOR: Model SR-3, complete with propeller and all accessories. Very good condition, price \$150. H.p. 40, weight 145 pounds. Les Long, Cornelius, Oregon.

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WANTED: Used Fairchild Cabin 24, with either Cirrus or Warner; have for trade either cash or Sport Travel Air, B-5 Kinner; ship just overhauled and recovered. Montgomery School of Aeronautics, Montgomery, Alabama.

WANTED: Perfect conditioned late cabin or open medium size plane, radial engine, must be bargain. State full details first letter, photo, total time, best cash price or what terms. AERO DIGEST, Box 1619.

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WANTED: Used airplanes, engines, miscellaneous supplies; parts. Give details. Post Office Box 172, Oak Park, Illinois.

WANTED: Waco F. Must be bargain. Slightly cracked F considered. Have Air King OX-5, excellent shape, to trade for what have you. Write Russel Neff, 1285 Sigel St., St. Paul, Minnesota.

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CASH FOR latest type two-place Aeronca, Great Lakes or what have you? Must be licensed and like new; price must be right. Jack Thomas, 1168 Cherokee Road, Louisville, Kentucky.

WANTED: Good used Szekely SR3-O engine. Also OX-5 Hamilton steel propeller. F. M. R. Electric Service, Bismarck, North Dakota.

WANTED: Airplane, licensed or unlicensed, or crack-up that can be repaired. George Myers, H and Luzerne Streets, Philadelphia, Penna.

WANT: Sikorsky or other amphibion or seaplane. Give details. Sell Wasp, Edo floats, and Henderson with propeller, \$55 each, crated. Chris Walton, 2830 Morgan, Tampa, Florida.

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WANTED: Taylor Cub. Please give complete history and full details about present condition and cash price. Also want complete top wing for Fleet, covered or uncovered. AERO DIGEST, Box 1635.

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ROBIN PARTS: Challenger; wings uncovered or covered to your specifications; fin, rudder, struts, dual controls, engine mount, oil tank, etc. Write and tell us your needs. Priced right and guaranteed. The Aeronautical University, 1338 South Michigan Ave., Chicago, Illinois.

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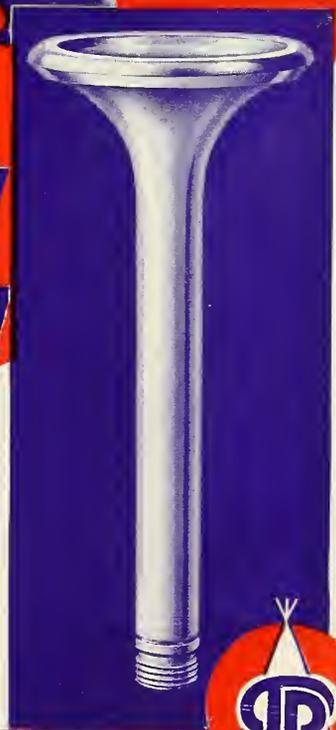
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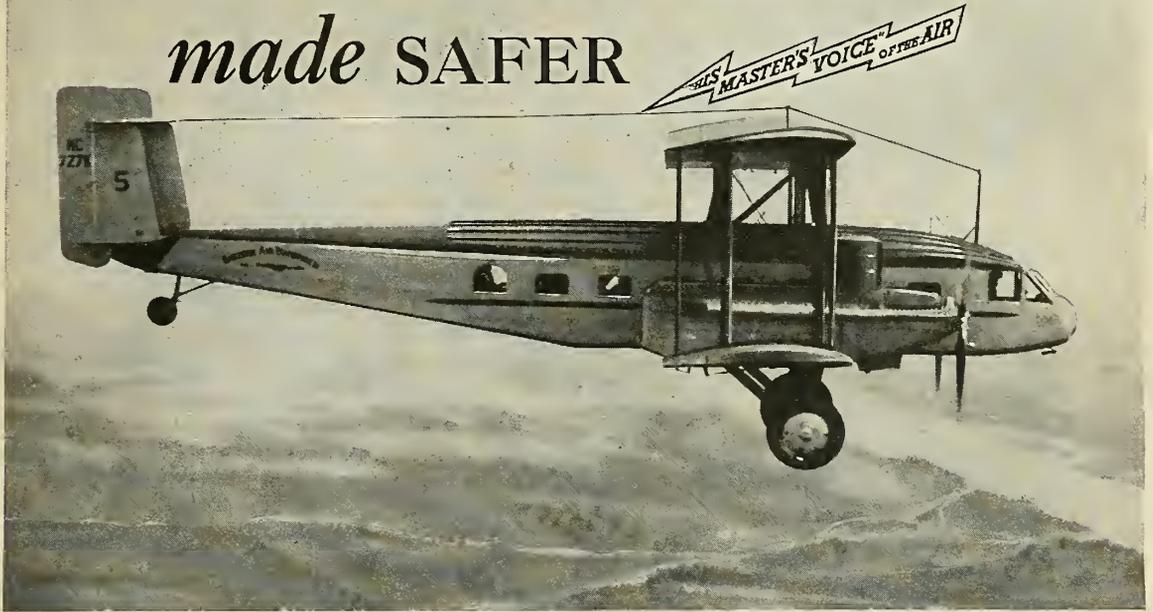
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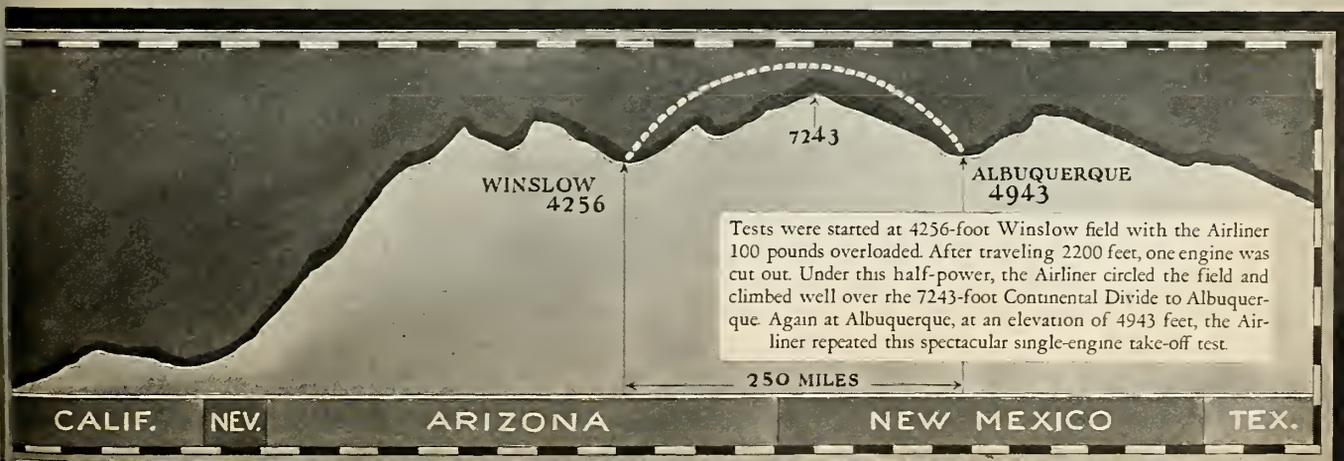
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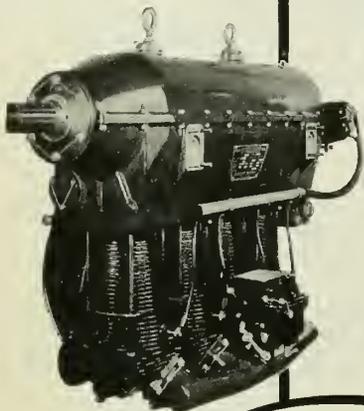
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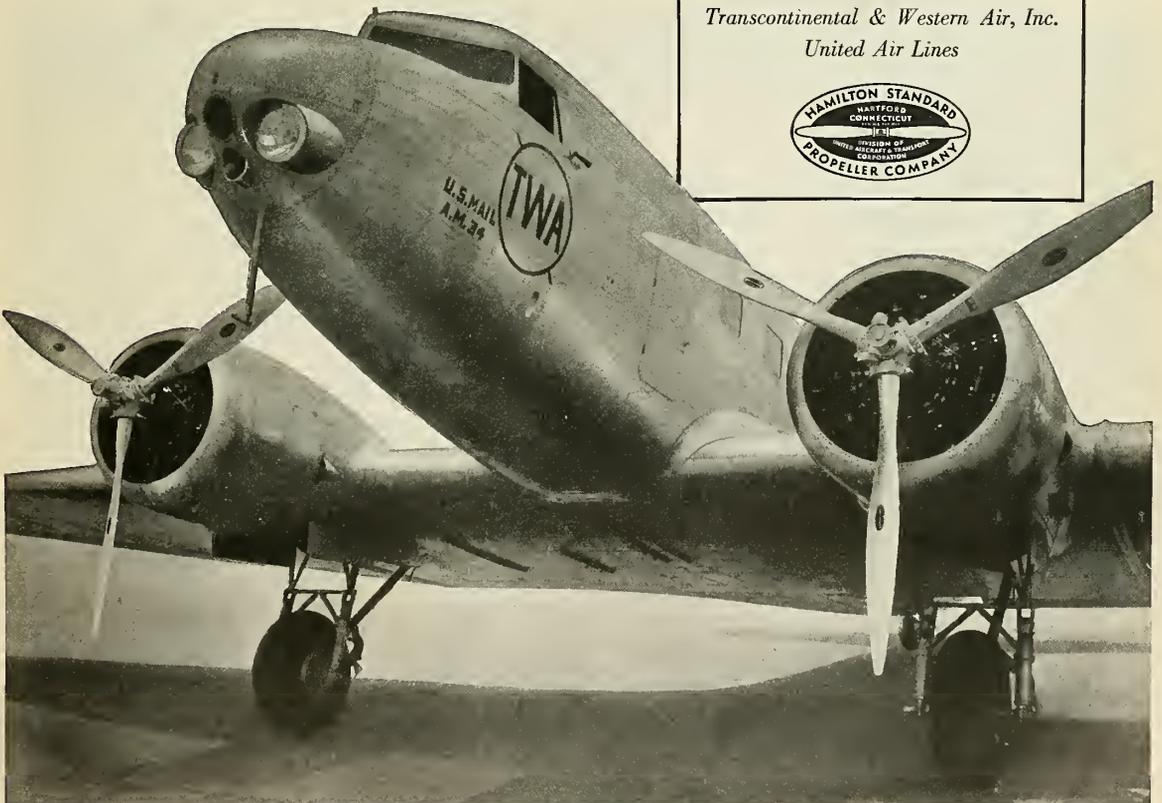
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VOLUME TWENTY-THREE

NUMBER FIVE

CONTENTS FOR NOVEMBER

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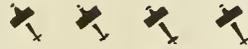


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The adoption of this type of mailing piece has been advocated frequently by AERO DIGEST in the past. To a profound mind determined upon being profound even at the expense of speed in an emergency, the "aerogram" may appear altogether too light a thought to warrant consideration. It has the merit of simplicity, and seems to meet at so many different points the perplexities of the air mail problem.

Cart Before the Horse

The policy of government economy going on at the present time is a movement in which no one can fail to discover many good features. But in seeking to justify what may be a disastrous over-reduction of air mail subsidies the rather illogical argument is advanced that there is great need to remove the so-called "subsidy taint" from air transportation. That is perhaps a worthy and laudable ambition, if we concede that any such "taint" exists, a condition which I do not believe is justified by the evidence. But in this situation those who profess, at the expense of aviation and its future, to be worried by the bogey of the "taint theory" have most decidedly put the cart before the horse.

If the eventual freedom of American air transport from the need of government aid is the goal of those responsible for formulating a new government policy for air mail, then that can be achieved only by following through on the same line which air transport has been traveling and which has brought it to its present position of high success. What air mail needs, and has always needed, is *more volume*. The government can assist in this by doing everything within its means to maintain the

highest possible efficiency in the service rendered. Such service alone can produce a new volume of business which will help air mail to win its way through to a position where it will be able to return a profit to the government.

Certainly this can not be done by reducing the efficiency of our air transport system. Do that at this time and a transportation service will result which will need more government aid than ever before. The railroads supply all the evidence which we need to prove the correctness of such a claim.

The Logical Answer

The desire to banish all aid from the government for air transportation seems to lead some people to the false idea that low government cost can be reached by increasing the postal rate on air mail. Whenever that has been done in the past exactly the opposite effect has invariably resulted. Higher air mail charges would certainly cut down the volume of air mail.

The "aerogram" seems to furnish the logical answer. It is a special type of mail. The arbitrary fixing of its rate at three cents should in no way upset the existing rate structure. It is a special kind of mail; not a bulky air mail letter. It is not the same as a regular envelope enclosed letter, which could continue to be sent first class for three cents. The "aerogram" would not be a robber preying upon other classes of mail with the blunt instrument of underselling.

Decision Is Necessary

It will be highly unfair to the air mail operators if Mr. Farley continues the generous policy of putting mail pouches on planes which are not flying on "mail run schedules," but are flying anyway because of passenger demand. This is a commendable gesture upon the part of operators who realize that they are dealing with a temporarily embarrassed department of the government. But it is a practice which, if too long continued, might develop into a permanent and generally unsatisfactory arrangement. Mr. Farley already may postpone for another year the job of coming to grips with the air mail problem unless those entitled to a "New Deal" in air transportation demand prompt decision upon this extremely important question.

● The future of American aviation has been "taken under advisement" by Postmaster General James A. Farley. In times of swiftly moving events, such as the present period, many important decisions made at Washington may be arrived at too hastily. Perhaps we should feel a measure of gratitude, therefore, for this special treatment of delay for deep thought on the part of Mr. Farley. Nevertheless, we would like to assure Mr. Farley that his indecision in the matter of approving a permanent program for air mail may prove disastrous to the aeronautical industry. We believe that the suspense should be removed from the "New Deal" for aeronautics which has now been in the promise stage for a long time.

The Clear Course

The record of the industry is sufficiently clear to leave little doubt as to the course which should be followed. Its record through the past four years indicates that the fundamental concepts of the Watres Act do not need radical changing at this time. With the assistance of that enabling act, the air transport industry has gone ahead; it has added to its traffic in a period when other systems of transportation have lost business. It has achieved its principal objective of creating a passenger air business upon the sub-structure of air mail.

An industry making progress in times of economic crisis certainly should not be stopped or slowed down. But this is exactly what indecision is doing to us. Continued delay has the effect of shaking confidence in the future and in the fundamental soundness of the air idea.

Jobs to Be Done

Delay would be understandable perhaps if there were not in existence ample evidence and data upon which to formulate a new Post Office policy for air mail and air transport. There is not only a sufficient supply of such material, which removes the danger of quick decisions, but there is also in plain view a considerable number of jobs which can be done and which need doing urgently.

One of these is the idea for the adoption of what has been called the "aerogram," a single sheet letter which in the folding produces its own envelope and also produces a piece of correspondence

The Grim Reaper Takes a Holiday

● It is to my deceased Uncle Cuthbert (the late Cuthbert Cassidy Caldwell, to give him his full name, and he usually was full) that I'm indebted for reporting a chat that took place just inside the Pearly Gates recently. Before he crossed the Stygian Ferry Uncle Cuthbert and I were very thick and since his departure he has fallen into the annoying habit of visiting me at midnight every third Friday. As an angel he is quite as thirsty and monotonous as ever. I've tried to discourage his visits, for he makes sorry inroads on my stock of bottled goods; there he sits on his night out, drinking Pilsner and tossing empties under my bed.

Well, it seems that Uncle Cuthbert was hanging around the Gates, when he should have been harping it with the rest of them, and he chanced to overhear a chat between the Angel Gabriel and the Grim Reaper. "I don't mind telling you," said G. R., "that I'm fed up working day and night in the Immigration Department. Under the NRA I'm entitled to an Assistant Fool Killer."

"How about me?" inquired Gabriel, sourly. "I haven't had time even to grease these hinges—hear that squeak?" He shoved the gates slightly, puffed savagely at his cigar, and sat down again.

"Now mind you," continued G. R., "I don't mind looking after our usual quota under the immigration laws. But those Japs have pushed so many Chinamen out of Manchuria that I've been rushed beyond endurance. I'm worn out, pal. If I don't get a vacation I'll have a nervous breakdown and be forced to go on a yeast diet."

"I'll tell you what, Grimmie," suggested Gabriel, tossing his horn into a corner, "if I don't toot for these new arrivals and you don't usher them in, they'll just have to stay where they are until we get around to 'em, won't they?"

"They sure will," said G. R.

"Then to H——" Gabriel caught himself just in time, looked around for chance listeners, and continued more calmly, "then the *deuce* with them. Nobody's so anxious to get here that he can't wait a day or two. Let's take Saturday and Sunday off and go fishing."

"What are the dates?" inquired G. R. "October 6 and 7," said Gabriel, glancing at a calendar advertising Flanagan-Nay beer (a *man's* beer, they explain facetiously), which Major Tom Lanphier had sent him.

"The National Charity Air Pageant will be held at Roosevelt Field then," remarked G. R. contemptively. "Do

C Y C A L D W E L L

you think some of those pilots would object to a slight delay in getting here?"

"I guess they wouldn't," said Gabriel. "You take the average pilot, now—he isn't even certain of salvation.

"Gabe, it's a go!" said G. R., tossing his scythe into a corner. "We'll take two days off and close up shop. What the—I mean, what's the difference? We get them all in the end, anyhow."

What, No Cadavers?

So that's how it was that no pilots or spectators departed this life at the Air Pageant. At least, that's what Uncle Cuthbert reported, and he was a most veracious soul who never lied to anybody but his wife, which of course is a permissible diversion. Anyone who visited the air meet will agree that Death certainly must have taken a holiday; for all natural laws and all sane aviation procedure were tossed merrily aside without diverting any new business to the local undertakers. At one mortician regretfully remarked, "At least we can't blame the Pageant management or the Department of Commerce for our lack of cadavers. They've done their part."

They certainly had. The regulations were violated repeatedly, although our new head of the Air Regulation Division of the Department of Commerce was on the field. I hear that he shuddered

once when Harold Neumann, doing a 250-mile-an-hour dive before the stands in a Howard racer, almost hit a passenger ship, part of the generally disorganized and uncontrolled air traffic, which blundered across his path. The planes missed each other by a few feet.

It was an exciting meet to watch. You never knew when or where, who or what was going to hit which. While the pageant performers were doing their scheduled acts, planes were taking off, landing, doing acrobatics of their own over a corner of the field, bringing passengers in from other fields, taxiing around the airport. A British Puss Moth distinguished itself by landing just in time to break up a squadron of U. S. Army bombers that were landing in formation. That little ship soon told the Army where to get off—two bombers landed but the rest scuttled into the air again and landed at Mitchel Field. The squadron commander deserves credit for his prompt decision not to engage in a dog fight with a Puss Moth.

The entire meet consisted of a series of interesting dog-fights between performers, contestants, and stray visitors equipped with every kind of airplane, which they hurled into the thick of whatever was going on. An amphibian came in and landed underneath a race, a jolly surprise for the racing pilots. Harold Neumann in his speed dashes threaded his way between whatever happened to be aloft. It was an amazing exhibition—I think he rolled around one of the visitors who was valiantly fighting him for position. Then off at the edge of the field an autogiro was towing a large net with an ad on it—evidently trying to net one of the Airaces stunt trio.

The soldiers on guard wore tin hats—they knew a thing or two. Who wants to get hit on the bare head with bits of airplane, anyhow? After the meet I sent a telegram to Clarence Young, "Come back. All is forgiven about you being a Republican—I've just seen a Democrat." If I could get Colonel Young back in there, I'd even be willing to take Hoover along with him. This meet was put on by a group of enthusiastic amateurs who admittedly knew little about air show management through personal experience. When it was obvious, during the first hour, that there was no sane control of anything, it was the duty of the Department of Commerce to demand control, or stop the meet. True, nobody got killed; but I've explained how that came about.

From the viewpoint of the spectators



"... tossing empties under my bed"

the meet was a success, at least on Saturday when the Marines and the Army did their stuff. On Sunday they did their part too early, before the bulk of the audience had arrived. Sherman Altick arrived about two o'clock; he was the bulk of the audience I referred to; he always occupies a large part of the grandstand himself, and Frank McKay takes up the rest of it when he isn't out on the field (although he usually is). That's why we were short of seating capacity at this meet.

Every Man for Himself

The show went off with great snap and vim, thanks to Ray Brown and Bill Ong, Chief and Assistant Chief of Operations, and to Earl Southee, Chief Starter. E. W. (Pop) Cleveland and these pilots did a swell job; and it wasn't their fault that visiting airplanes "competed" in the events. I saw these officials dashing hither and thither like startled hares, trying to flag chance airplanes down or to prevent them from starting; but all they got was a series of Bronx cheers as the mob of visitors leaped into the air and tried to drive the performers down. It was a hopeless task trying to keep the field clear. Fortunately, Airaces, Inc., who are professional showmen, and know their stuff, threaded their way between aerial obstructions and gave the crowd a show. George Orr and Jim Guthrie, president and treasurer of Roosevelt Field, who had turned the whole field over to the Pageant management and then could do nothing about it, walked around in various stages of nervous collapse. Next time they'll keep control of flying themselves, and put out a sign closing the airport to mavericks.

The best part of the show, of course, was the Army and Marine maneuvers. Next to that came Airaces, Inc., with George Burrell rolling a Ford on top of a loop, delayed parachute opening by Clem Sohn, stunting by Roy Hunt, crazy flying by Dick Granere, ribbon cutting by Art Davis, speed dashes by Harold Neumann, and the Baby Ruth Race, sponsored by Mr. Otto Schneering of the Curtis Candy Co. That's just a show run on the Ben Hur principle—first the white horse forges ahead, the black catches up to him on the turns, and then the white horse finally wins. But the crowd doesn't know the difference, so it's all right. Naturally, Johnny Livingston played the part of the white horse. Jack Story's vivid announcing guided the crowd's understanding of the events and added greatly to their enjoyment of the meet. Jack is an artist on the microphone.

As part of the show the Army bombers blew up Depressionville, a simulated village across the field, after which the 7th Regiment, N. Y. National Guard, attacked it in a businesslike manner. After-

wards, as guards, they also attacked several of the spectators and race officials, throwing Jimmie Taylor, president of Air Associates, and Tom Hildebrandt, who had been acting as speed event timers, off the field. They grabbed Jimmy and thrust him right under the fence. I thoroughly enjoyed this feature, until the hard working and conscientious 7th Regiment grabbed me and threw me off, too. No hard feelings, 7th. You seen your dooty an' you done it! The fault was the race management's. They took a leaf out of the Henderson brothers' book, and cancelled the field passes they had issued on Saturday. There was I, holding hopefully to a pass that had been all right on Saturday—and the brave lads in khaki declared that they had been instructed on Sunday not to honor those. So out went the Press—cursing forlornly. It was Johnny Livingston, in uniform, who rescued me. If any race management wants to imitate the Hendersons they might also try to imitate Henderson efficiency.

The Fashion Show

The 14th Regiment, N. Y. National Guard, sent 120 men, and with the 7th that made around 1,000 healthy soldiers on the field. A guard of honor from the 7th in formal dress uniform made a fine appearance in their white slacks, grey tunics and white braid. The only trouble was that when any exciting event occurred they stood up to watch, and they weren't very transparent. If they use these boys again, they might dress them in cellophane. As Society with a capital S turned out to watch this meet, the management put on a fashion show, with beautiful models parading around in sundry lovely costumes. I'm a trifle old, but if the model in the gold dress cares to write I'll be glad to hear from her—I found the Mae Western hip movement distinctly intriguing.

Major Alexander P. de Seversky made an unofficial world's speed record for amphibions with 180 m.p.h. in his new



"You couldn't tell when you'd get hit"

Wright-engined ship, which he designed himself. It is the fastest craft of its kind ever built. James R. Wedell tried to better his world record for landplanes of 305 m.p.h. He made two of the four dashes, was clocked at 302 m.p.h. and then he noticed the cowling moving forward to enter a dog-fight with the propeller, upon which he descended with commendable rapidity.

The Charity Air Pageant was deficient in comedy relief until the day after it had been held, when the treasurer made his glum and final report. It appeared that the kind gentlemen who had started off so gaily to help some worthy charities were now objects needing charity themselves. For lo and behold, the management filed a petition in bankruptcy listing liabilities of \$53,325 and assets of \$12,957. Brother, can you spare a dime?

The details are sad. Thirty parachute jumpers, who didn't look before they leaped, are at this writing out just \$1,200, at \$40 apiece for their jumps. However, they have some sprains and bruises to show for their efforts when they get back home; and they had the fun of jumping, anyhow. Bill Enyart, efficient NAA Contest Committee secretary, demanded cash in hand before he would sanction the races, so all contestants were paid in full, which is a blessing. The losers appear to be business men, field officials, parachute jumpers, and the U. S. Marines. The Marines from Quantico hold a check for \$1,328 for their expenses; and they may continue to hold that check, for the bank looketh askance at checks from bankrupt corporations. Yea, verily. The Army, being blessed with two Captains of a skeptical turn of mind, demanded cash at the field box office, and got it, so went their way rejoicing.

Editorial Note

In my remarks last month relating to the Chicago Air Races and commenting on the death of Miss Florence Klingensmith in a Gee Bee racer, I mentioned that the ship had been built for the Cord Corporation in 1930, was designed for a 240 h.p. engine, but a 500 h.p. engine had been installed. It was not my intention to imply that this change of engines was made by the Cord Corporation; but it has been pointed out to me that such an erroneous interpretation has been placed on the story by a few of my readers. I should have stated in my article that the Cord Corporation long since had removed their engine, instruments, etc., and disposed of the remainder of the ship. Of course, they were in no way responsible for what alterations were made to the plane afterward. It was entered in the race by A. D. Knapp, and we have no detailed information on changes made in the ship by its latest owner.

E D I T O R I A L S

"Germany's claim to simple justice and security is that either all States decide and undertake immediately within the necessary time limit to abolish their air forces, or Germany must claim the same right as the other States to maintain an air arm which will then also be essential for the defense of the country."—M. R. NODOLNY, Head of the German Delegation at the Disarmament Conference.

Paint and Safety

• There is a safety factor in colors which many airplane owners and makers are inclined to ignore. This is frequently done unintentionally or in order to satisfy some personal preference for a particular color or combination of colors.

The airplane designer and the theory of aerodynamics leaves little in the matter of personal choice to the owner or operator of airplanes in the matter of shape and design. So perhaps when it comes to the paint job, the owner feels that here at least his own preference should be considered. Frequently they are, to his own ultimate danger. In this connection the most serious offender is not so much the man who goes in, by preference, for loud and striking colors as the modest flyer who prefers to be as inconspicuous as possible.

The following out of this instinct is apt to create in the paint job a plane which is altogether too inconspicuous just when it should be most obtrusively apparent—a forced landing which becomes the object of search, or when taxying, or coming in for a landing at a crowded airport. A special danger in this situation is the combination of normally highly visible colors which combine to give a low degree of visibility. As we study the problem of the safety factor in airplane coloring, we see that there may be such a thing as camouflaging the flier into danger.

There is much serious study still to be done on this important problem. It is one solution which we notice in the standard use of the shade known as chrome orange for the wings of military planes. This is a color with a high degree of visibility, particularly when seen from the air against the background of either land or water. This military solution is not necessarily the only solution. It does not mean that all planes should be painted in the same shade. The removal of this apparent incidental handicap to safety in coloring should be one of the objectives of further research.

The Dignity of A Profession

• Workers in the technical field of aeronautics should give serious consideration to the question of the registration of engineers. This concerns itself with a dis-

ussion which has been current for some time in the engineering profession.

Because engineering does enjoy the status of a profession, some of its members insist that submitting to registration by the state is tantamount to surrender of some of the freedom and prerogatives of that professionalism. This is a short-sighted view. The dignity and status of a profession can be maintained only by keeping its membership open exclusively to those who are qualified to belong. In a country which long has been inclined to give much respect to the title of "engineer," there is a natural tendency toward the misappropriation of this worthy distinction. Without the instrument of state controlled registration anyone who cares to can confer upon himself the title of "engineer."

It is not unnatural that, in a new science such as aeronautics, we should find a great deal of this dishonest appropriation of an unearned name. Those entitled to the use of the name "aeronautical engineer" should take steps to see that the honor and distinction of their profession are upheld. If this movement is not started now by those most interested, it may be done ruthlessly from the outside in that dark day when the reputation for reliability of aircraft is placed in jeopardy.

More Good News From Washington

• Word comes from Washington that the cause of American military aviation is to be permitted to participate in the appropriations of the Public Works program. The first step was taken when it was announced that the Public Works Administration had made an allotment of \$15,000,000 to the Army and Navy for construction of airplanes.

This is indeed an occasion for rejoicing upon the part of the American aeronautical industry. It most certainly is not a time for greed or selfishness. There should be in this first allotment to aviation of Public Works funds enough business to go around for all qualified to do the work. Sound and serious competition to win this business will be a sound and acceptable sign. But cut-throat and underhand methods—the backroom conference—cannot be tolerated by those who have at heart the best interests of the industry.

To Lease or Not to Lease

• The long delayed departure of our unwelcome guest, the Depression, is bringing to light new angles and phases of the interesting question of leasing municipal airports.

As the Depression has continued unduly long many municipalities which thought they had the management of their airports definitely off their hands find them back, this simple transference being achieved by an airline going out of business and the commercial operator of the city airport going broke. The situation is sometimes complicated by the fact that cities in this situation and in this year of economic troubles are disinclined to take on the added expense of running an airport.

The answer to the question, "Who should run the municipal airport?" is not one to be answered lightly. Circumstances alter cases. If the purpose of the municipal airport is to attract air commerce to a city, the municipal airport, it seems to us, must be considered a city function, just as it is a city's function and duty to maintain steamship piers for maritime business.

However, the completely commercial point of view fails to take into consideration the element of private flying. Where private flying is an important factor in a city it should have equal consideration in dividing the privileges of the air terminal. A city which is in a position to attract air commerce in large volume, particularly through providing terminal facilities for regularly operated lines, must do this. Much sport and private flying and instruction work may not seem to the fliers to be as welcome on such a port as it would be if there were no airlines. But the situation is not altered by the fact that the airport is directly operated by the city, or privately under lease. The differences here should not be too difficult of solution. The procedure of having open and closed periods for the port should suffice.

Airports should make money, if they can, regardless of whether they are municipally, or privately operated. If they are run with that end in view, funds become available for continuous terminal improvement, which is of equal advantage to both the private and commercial flier.

The Industry Goes on Record

AERO DIGEST'S QUESTIONNAIRE-SURVEY ON AIRCRAFT MARKETING YIELDS RESULTS

CHARLES J. CUTAJAR

In this fifth article of the series on the marketing of aircraft for the private and business owner, Mr. Cutajar presents the opinions of leading sales executives, dealers, manufacturers, airport officials, etc., on eight important questions. Next month's article will be devoted to a discussion of methods which might be considered by the industry as a whole to meet some of the problems disclosed here.

● What condition or circumstance today is the greatest help or the greatest hindrance to the sale of aircraft? What does the prospective owner seek uppermost in an airplane? What should be done to reach him and sell him? What increase in sales can be expected next year?

These are fine riddles to hurl at harassed executives. Yet hurled they were, and lo! the answers came back in full measure and filled to overflowing. If the unequivocally stated opinions of the key executives of practically every aircraft manufacturer, of many of their important distributors, of many of the leading engine and accessory manufacturers, of the officials of important airports, flying services, schools and oil companies, can be accepted as representing a true cross-section of the industry, then the industry has indeed gone on record.

Limitations of space unfortunately prevent reproducing in these columns the many splendid answers to AERO DIGEST'S questionnaire. It is possible only to present a consolidated report, giving the majority opinion on each point. The questions and summarized answers follow:

Question 1. What do you regard as the greatest single handicap to the sale of private planes today—aside from the general economic situation?

As might be expected, economic considerations are reported as the greatest barrier to aircraft sales. Public resistance to the idea of aircraft ownership and the lack of airport facilities especially suited to the requirements of the private flier are given as other drawbacks. 52+% of those answering mention economic handicaps. Of these, 31+% state that the type of plane that *buyers want* costs too much and that the cost of engines, materials and accessories is excessive; 13+% declare that service, maintenance and operating costs are too high; 7½% complain of the lack of provisions for installment payments, the high cost of instruc-

tion, and drawbacks concerning life insurance and property damage policies.

More than twenty-three per cent encounter an unfavorable attitude on the part of the public, citing lack of adjustment to plane ownership in the present scheme of life, general lack of air-mindedness and unfamiliarity with the advantages of air travel, and finally (13% of this group) lack of confidence in the safety of airplanes—fear. Inadequacy of facilities for fliers, particularly service facilities and the inaccessibility of suitable airports are mentioned by 10+%. Other reasons given are selling weakness, particularizing lack of contact with the right people and absence of display showrooms at airports (7%), and the necessity of considerable practice to assure safe flying (5%). One per cent give minor reasons, such as the uncertainty of flying weather.

Question 2. What is the most encouraging factor in the market for private airplanes—aside from the general economic situation?

By far the most substantial group find encouragement in public interest in aviation. Others hail the advancements achieved in plane design and manufacture, plus the reduction in stocks of old and used planes. Still others view favorably the improved facilities for the private flier, plus reductions in service costs. The enlightened interest of the public is mentioned by 54+%. Of these, 25% attribute this gain to public travel on the airlines. 18+% cite the general sustained interest and participation in flying throughout the depression, with increased recognition of the safety of flying. 5% mention the high student enrollment and the increased average age of both students and buyers from a former average of 18 to 25 years to the present of 30 to 40 years. 4% see hope in the air-mindedness of the younger generation and 2+% note an increase in the number of serious inquiries.

Improvement in airplanes is considered a helpful factor by 17+%; of these, 13+% stress the increased comfort, reliability and stability of the newer types and 4+% attach importance to the appearance of light planes at low prices. 12+% view with satisfaction the shortage of old, used equipment. 9% mention lower charges for storage, service and maintenance and 6+% welcome the new airport facilities for the sportsman flier and the impetus given to the sportsman-pilot movement generally.

Question 3. What percentage of increase in volume in the sale of private planes can the industry as a whole reasonably look for in 1934?

Well, the industry expects a 30+% increase in airplane sales next year—and that's that. As might be expected, many of the predictions are contingent and are made with reservations, but the consensus of opinion is clear. 72% of all responders quote a definite percentage of increase. None expect a loss and only two fail to anticipate an increase. The lowest increase mentioned is 3% and the highest 100%. The majority run from 20% to 50%. Of the 28% of responders who do not mention a definite percentage figure, 16+% look for an increase in proportion to business improvement, one predicting an increase of two or three times the general barometer; 11+% give varied predictions such as a "small" increase; a "bright spring," an increase dependent on radical changes in service; an increase depending upon the manufacturers offering the public what the public will pay for rather than "what the manufacturers think they should have," etc.

Question 4. What, above everything else, does the present-day owner seek or demand in an airplane for private or business use?

On questions having to do with the desirable qualities of an airplane, it is natural for the individual to allow impartial judgment to be influenced to some extent by personal preference. Nevertheless, while the answers to this question are somewhat diversified, it is evident that there is a strong appeal in improved performance (particularly in higher cruising speeds) and in economy of operation. 29% of those replying mentioned performance and of these 16% stress high cruising speed; 7+% specify general per-

formance including quick take-off and low landing speed, plus utility for the particular purpose desired; 5% mention better dynamic control, ease of handling in the air and on the ground, and simplicity.

Better economy is demanded by 25+, of which 19+% seek reasonable economy in upkeep and operation and only 5% ask for lower original cost. Safety is next in importance with 13+% demanding a high safety factor including a lower landing speed, particularly for the new owner. Comfort runs close to safety with 12+% and next comes reliability with 11%, with a proportion specifying reliability of the engine. Of the balance 5% mention, in the order named, (a) good finish of the interior and exterior—snappy appearance, (b) care-free operation and fewer repairs, (c) the importance of little details of construction and equipment. Of the remaining 2%, some seek the absence of noise; one considers that the airlines have reduced the usefulness of the business-owned plane.

Question 5. What have you found to be the most frequent buying motive in the purchase of airplanes for (a) Pleasure, (b) Business?

Some responders have apparently read Pleasure *versus* Business into this question, but the majority of the answers are to the point. Some of them mention the ratio of planes sold for pleasure as compared with those for business purposes. There appears to be a wide variation in this, depending to some extent upon the plane, but to a greater extent upon the location of selling activity. In social centers the proportion of airplanes flown for pleasure is naturally greater than in oil and mining districts.

Taking the market for private ownership first, 54+% construe the principal buying motive as pleasure, the joy of flying, the love of the sport, recreation, adventure, relaxation. A small fraction of these are reported as using planes for both pleasure and business. 22+% report the buying impulse as "individualism," satisfaction of pride, gratification of accomplishment, thrill of ownership, enjoyment in getting around in a modern manner. 9+% ascribe social motives, week-end trips, flying club interest, and "because some friend owns a plane." Another 9+% are bought for partly commercial purposes, to build up hours, possibly leading to a position in the industry. 3+% are bought to reach places otherwise difficult of access. Those who included desirable airplane features in this answer mentioned comfort and low first cost as of equal importance, next safety, and next speed and maneuverability.

For business purposes, 48+% declare speed in transportation to be the outstanding requirement. 20+% cite advertising value. Next with 17+% came utility, particularizing general range of purposes; payload; object to increase sales;

to gain distribution quickly. 13+% quoted superficial reasons or mentioned combination of business and pleasure. Of those who listed plane qualities, 50% mentioned low operating cost and the rest were evenly divided among flying characteristics, comfort and low price.

Question 6. What feature or characteristic in an airplane will prove most effective in attracting buyers next year?

Here partisanship enters and opinion is pretty well divided. Economy leads with 30%. Of these, 14% believe that owners are looking first for the most airplane for the money and want low first cost. 16% have an eye for low cost of upkeep and operation. A close second to economy with 29% is performance. Here 18% demand a large speed range, particularly a higher cruising speed with no increase in landing speed. 8+% place importance on all-round performance and 2+% mention ease of handling.

14% are concerned with equipment of which half demand maximum comfort and the balance specify variously, a modernized cabin with complete equipment (no extras), slots, flaps, retractable gear, controllable pitch propellers, good vision, amphibion landing gear. 9+% have in mind safety, stability and reliability. 7% consider appearance, trimness, good finish, "appearance of speed." 4+% want better terms, mentioning a 3-year installment purchase plan or other financing plan, better insurance protection, instruction course in the price of the plane. 2% thought to mention that reputation is a factor. 4% agree that makeshifts are out and that most buyers are sold on the conventional type of plane; this group includes boosters for 2- to 4-place light cabin planes and side by side convertible sport planes.

Question 7. Do you care to suggest what method is most effective in identifying and reaching the prospective private owner?

Well, it seems that a gallon of good corn helps to "reach" the prospect sometimes—or you might go hunting with him. The boys will have their fun. Most of the answers, however, are thoughtfully considered, if not wholly enlightening. Only about half the responders indicate the preferred method of original contact and of these 51+% suggest advertising to be followed by intensive personal follow-up, 36+% specifying publication advertising, 9+% direct mail advertising and 4+% local advertising. Contact solely via sales organization and dealers is voted for by 44+%. Newspaper publicity is mentioned by 4%.

Miscellaneous sources of prospects mentioned without indicating how to reach them are: People interested in aviation other than aircraft personnel; friends of satisfied plane owners; contacts made at airports; air shows (not circuses); analysis of "next door neighbors";

people under 50 who patronize air lines frequently; flying clubs; persons of financial and social standing in smaller cities and towns; people of means who are followers of sports; people who get about.

Unclassified comments: Carefully analyze the needs and requirements of individuals and corporations and follow up closely. Display planes in auto-type show rooms at the airport. Constantly put your ship before the public. The manufacturer must assist the dealer in every way to make money.

Question 8. What, if anything, should the industry as a whole do to expand the private airplane market?

Here again the industry holds economic considerations paramount. 42+% of the answers are dollar-and-cents conscious. Of these, 18+% urge the importance of producing planes that can be sold at a price nearer the average owner's pocketbook. Some suggest mass production might be achieved if models were not changed so often. 6+% recommend building reliable cheap engines so that the cost of airplanes can be reduced. 13% want to see drastic reductions in all charges for operation, maintenance and replacements; they believe that more interest should be evidenced in the owner after the sale to assure him a square deal. 3+% would like to see (a) Government aid in private airplane ownership and (b) a method of installment buying.

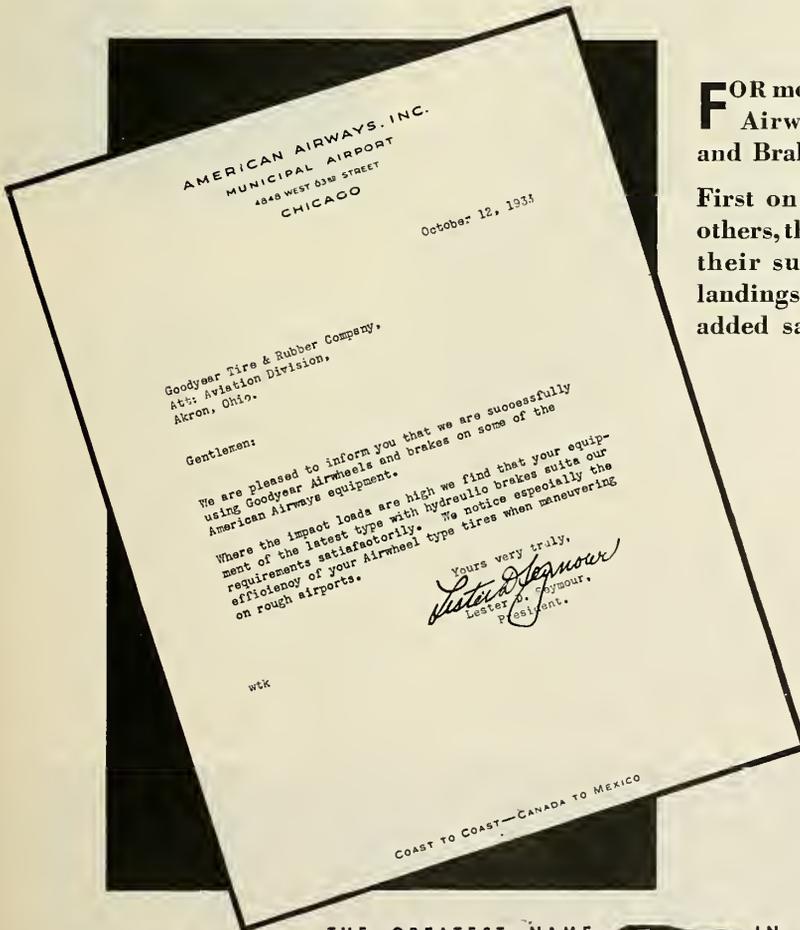
Next to economies, promotion holds interest. 35% make suggestions. Some of these are: Resume the All-American Aircraft shows. Promote sportsmen's tours and events. Encourage flying clubs and flying activities generally; promote cross-country races for different classes of planes. Promote additional training of students. Re-enlist interest of former students and pilots. Teach people to fly. Simplify licensing of pilots. Do group advertising, when the industry can afford it. Preach safe flying; remove the spectacular from aviation. Conduct Aeronautical Chamber of Commerce sponsored tours for sales demonstration purposes.

Suggestions in selling come from 13%, half of which bear on fair practices. These latter advise the industry to get together on a mutual sales code, establish fair commission policies, stop chiseling, stop knocking competitors' products, stop prospect stealing. Other suggestions are for manufacturers to cooperate more closely with distributors and to endeavor to attract good business men into the dealer field; also to establish cooperative show rooms in large city airports; 5% would like more airports for the private flier. 4% think it would help to develop greater safety and ease in flying.

* * * * *

There are your answers. In planning sales and production for 1934 the Industry will do well to give heed to the considered opinions of its chosen spokesmen.

Two years of AIRWHEEL experience satisfies AMERICAN AIRWAYS



FOR more than two years now American Airways has used Airwheel Tires and Brakes.

First on one type of ship, and then on others, these big, soft-rolling tires proved their superior safety and cushion on landings and take-offs. Then came the added satisfaction of the new Airwheel

Hydraulic disc-clutch type Brake. As a result, today, all American Airways Pilgrims and Model T Stinson Trimotors—and a high percentage of all their Stearman and Pitcairn mail planes have Airwheel Tire and Brake equipment.

There's no doubt about it, the Goodyear Airwheel has something which air transportation needs—and which passengers can appreciate. For complete data and prices write to Aeronautics Department, Goodyear, Akron, O., or Los Angeles, Cal.

THE GREATEST NAME IN RUBBER

GOODYEAR



WHEN YOU BUY A NEW SHIP SPECIFY GOODYEAR AIRWHEELS

THIS is the first of a series of feature articles outlining the historical development, scope of operations and executive personnel of the major aeronautical organizations of the United States.

The Cord Corporation

AN ACCOUNT OF ITS AERONAUTICAL ACTIVITIES

● No story of the Cord Corporation could be told without including the story of the man behind it—a man whose meteoric rise in the industrial world is one of the outstanding achievements in modern business.

It is comparatively only a short time ago that E. L. Cord tired of trying his hand at automobile racing and various other endeavors and became an automobile salesman. Selling Moon cars in Chicago in 1919 was profitable and his efforts were so successful that his employer soon owned the largest agency in the country. But in 1924, Cord found that the car he represented was losing its appeal and decided to enter the production end of the automobile business.

He was introduced to the president of the almost-insolvent Auburn Car Company and spent a little time at the factory. He returned to Chicago with many ideas and plans for a new model, and after "dressing up" and disposing of the previous models in the factory, prepared to market the new car. Backed by definite notions of what the public wanted, Cord introduced a car which featured snappy lines, speed to match its appearance and advanced engineering refinements. He was made vice-president and general manager and was largely instrumental in bringing more than half a million dollars in profits to the company within six months.

By 1925 Cord was president of Auburn and in 1926 he was ready to enlarge his sphere of activities. Always a lover of speed, Cord assumed control of Duesenberg, Inc., a company principally manufacturing racing automobiles and that with little financial return. Then in 1927 he took over control of the Lycoming Manufacturing Company which had been supplying engines to Auburn and had long been building automotive, marine and industrial engines.

At this point, Cord decided to consolidate his position, but in 1929 The Cord Corporation was formed as a holding and management company for the properties he and his associates controlled. Then came his entry in the aeronautical field.

When the Cord Corporation became concerned with aviation through its connection with the Stinson Aircraft Corp., inquiries came to its officials from many parts of the country. Some people congratulated them on their move; others were surprised that Cord would take aviation so seriously. Cord explained that aviation to him and his associates was solely a means of transportation. His personal experiences in the air (he has a pilot's license) convinced him that this new factor for speed was worthy of investigation.

Feeling that the cost of planes must be lowered; that the public preferred to ride in cabin planes; that flying must be made



E. L. Cord

easy for the individual and that the purchase of a plane must be simplified, Cord set out to accomplish just those things. He cut the price of models which formerly were selling for \$11,000 down to \$5,775 and embarked on a campaign to educate the public in the advantages of flying.

Not content with manufacturing and selling airplanes, Cord and his corporation decided to fly them, and in March, 1931, entered the operations field with the establishment of Century Air Lines and Century Pacific Lines, Ltd., two transport companies which operated on a basis of reduced fares and frequent schedules.

Century Air Lines operated between Chicago, Detroit, Toledo, Cleveland and



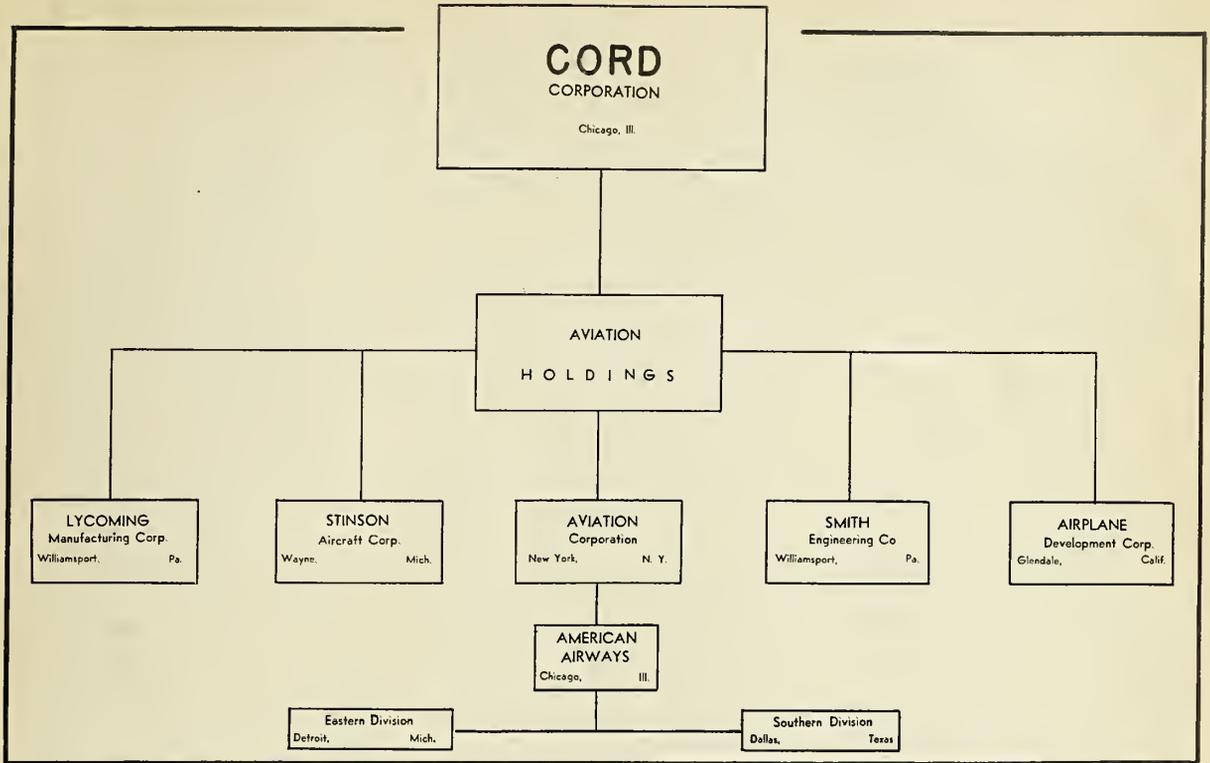
L. B. Manning

C. R. Smith

R. C. Marshall

B. D. DeWeese

F. M. Bender



Organization chart showing the Cord Corporation and its aviation holdings

St. Louis over routes totaling 886 miles. Exclusive passenger service was maintained, and a special express department, separate from the traffic department, was created to develop new business. South Bend, Ind., was added during the first month of operations and in September Bloomington, Ill., was made a stop. Fourteen Lycoming-powered Stinson Airliners were pressed into service to carry the 40,213 revenue passengers who flew during the first six months of operations. In mid-September maintenance and operations divisions and general headquarters were located in a new hangar on the Chicago Municipal Airport, where today American Airways maintains its offices.

Century Pacific Lines, Ltd., began

operations between San Diego, Los Angeles, Fresno, Oakland and San Francisco, but extended the route to approximately 900 miles and made Sacramento and Phoenix, Ariz., terminals. Twenty-six daily schedules were flown and at the end of four months, 16,000 passengers had taken advantage of the low fares.

In the early part of 1932 the Cord Corporation sold its holdings in its transport companies to The Aviation Corporation and American Airways. Mr. Cord occupied a place on the directorate, and with his subsequent assumption of control of these companies, brought under his scope one of the largest transport units in the world.

The year 1933 has seen further expansion

of the Cord Corporation. As an additional step in rounding out the company's manufacturing facilities for the building of various units of transportation, it acquired the New York Shipbuilding Corporation, one of the oldest builders of battleships and commercial ships in the country. Three weeks later control of the Checker Cab Manufacturing Corporation passed into the hands of The Cord Corporation, giving it the ownership of one of the largest taxi cab manufacturing companies in the country.

Today its activities include holdings in companies whose scope entails transportation on water, land and in the air. Among its other properties is the Central Manufacturing Co., manufacturers of automobile bodies; Columbia Axle



P. G. Kemp

D. P. Smith

L. D. Seymour

Gerard Vultee

W. H. Beal

Co., auto and truck axles; L. G. S. Devices Corp., free wheeling devices; Limousine Body Co., custom and convertible auto bodies and the Spencer Heater Co., manufacturers of boilers and heating units.

Abounding in romance, heaped with the trials and tribulations of a growing industry and flushed with the enthusiasm that comes with the sight of the much-desired goal, here is a saga of aeronautical enterprises, which because of their rapid rise, justly deserve a place beside the skyrocketing career of their leader, E. L. Cord.

THE AVIATION CORPORATION

Formed in 1929, the Aviation Corporation brought a great system of airlines under its control. As a holding company, it took over Universal Aviation Corporation, Southern Air Transport, Colonial Air Transport, Canadian Colonial Airways, Colonial Western Airways, Embry-Riddle Aviation Corporation and Interstate Air Lines and continued to operate them as its divisions. In addition, the corporation, through Roosevelt Aviation College, Inc., and the chain of Universal Aviation Schools (operated as divisions of the corporation) made preparations for an extensive system of flying schools throughout the country. The Universal schools alone occupied units at St. Louis, Minneapolis and St. Paul, Marion (Ill.), Kansas City and Rochester, Minn. Also added to the ever-growing chain of its holdings was Fairchild Aerial Surveys, Inc., and Fairchild Aviation Corporation, which manufactured a standard line of aircraft and aircraft engines, with factories at Farmingdale, N. Y., and Hagerstown, Md.

In 1930, having brought about the formation of American Airways, the corporation kept abreast of the trend of the times by combining the Colonial units into the Colonial Division and then turned this, and the four other divisions, over to the airline company to eliminate duplication of effort and material. By this coordination, the corporation continued to maintain control of a portion of the major airlines in the country, and that year successfully bid for the new southern transcontinental air mail contract offered by the Post Office Department under the McNary-Watres act. In preparation for this service, the Aviation Corporation purchased the assets of Standard Airlines which operated between Dallas and Birmingham, as well as the equipment of Southwest Air Fast Express (S.A.F.E.), which had operated between St. Louis, Tulsa, Dallas and Kansas City. The contract for CAM 33, the route involved, was awarded to Southwest Air Fast Express and Robert-

son Aircraft Corporation and later transferred to Southern Air Fast Express, a jointly owned subsidiary. With the inauguration of service on October 15, 1930, the Aviation Corporation controlled the entire link in the transcontinental chain and with the new contract added to its holdings by the inclusion of a mail line between Big Spring and San Antonio, Texas.

In 1931, the Corporation continued the process of expansion and organized the American Airplane and Engine Corporation following the resignation of Sherman Fairchild, who retained the aerial survey company and the Hagerstown plant. This organization took over the manufacturing facilities of the Fairchild plant at Farmingdale, N. Y., and continued production of several former Fairchild models under the trade name of Pilgrim. Major engineering and production activity, however, was centered around a new ten-place monoplane known as the Pilgrim 100-A which was designed to meet the operating requirements of American Airways and other airline companies. The manufacturing company also was in production of a six-cylinder, inverted, in-line, air-cooled engine known as the Ranger and experimented on a twelve-cylinder, inverted V-type air-cooled engine.

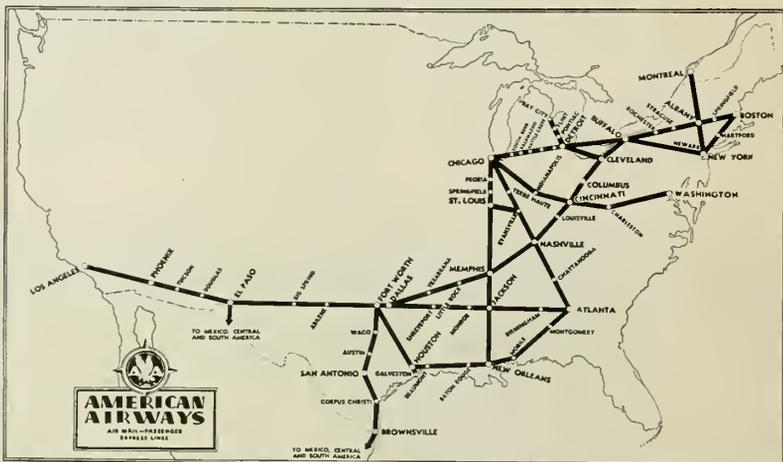
The Corporation made further progress in 1932 in its plan to bring the activities of its various airline properties under the flag of American Airways and finally tied them all into one vast system under the leadership of Frederic G. Coburn. This consolidation and coordination program was continued throughout the year.

Early in 1932, the Corporation purchased the assets of Century Air Lines, Inc., and Century Pacific Air Lines, Ltd., subsidiaries of the Cord Corp., operating a system of airlines radiating from

Chicago and Los Angeles, respectively. Mr. Cord then took a place on the directorate of the Aviation Corporation, whose president was LaMotte T. Cohu, successor to Mr. Coburn. Subsequently, Mr. Cord assumed control of American Airways and the Aviation Corporation, and a new board for the latter was constituted. It consisted of A. G. Carter, C. C. Conway, E. L. Cord, C. C. Darling, L. B. Manning, R. S. Pruitt, F. A. Vanderlip, L. L. Young, LaMotte T. Cohu, G. R. Hann, W. A. Harriman, R. F. Hoyt, C. L. Lawrance, Robert Lehman, L. C. Morton and M. S. Sloan. A board of five directors was named for American Airways, Inc., consisting of R. F. Hoyt, G. B. Grosvenor, L. D. Seymour, L. B. Manning and L. L. Young. This was December 6, 1932. On March 15, 1933, the two companies were again reorganized as follows: Directors of the Aviation Corporation; W. H. Beal, C. C. Conway, E. L. Cord, C. C. Darling, L. B. Manning, R. S. Pruitt, L. D. Seymour, F. A. Vanderlip, L. L. Young. Directors of American Airways, Inc.; E. L. Cord, L. B. Manning, R. S. Pruitt, L. D. Seymour, L. L. Young.

The present executive personnel of the Aviation Corporation consists of L. B. Manning, president; T. J. Dunnion, treasurer; R. S. Pruitt, secretary, with Mr. Cord acting as chairman of the board.

Transamerican Airlines and Martz Airlines then came under the scope of the Cord institution after substantial and controlling interests in them had been purchased by Mr. Cord. Although Transamerican continued to operate as before for a few months, it finally was made a part of American Airways and became known as the Eastern Division of American Airways, and R. C. (Tex) Marshall, formerly its president, was placed in charge as vice-president. At



From Coast to Coast and Canada to Mexico, American Airways planes fly mail, passengers and express over 10,643 miles of airways, touching 72 principal cities in the United States and Canada. Its present schedules require it to fly about 13,678,500 miles each year

the same time, American Airways combined its southern operations into a unit known as the Southern Division and placed C. R. Smith (long associated with air transport activities in Texas and with American Airways) in charge of it as vice-president. Meanwhile, the Corporation sold its holdings in Alaskan Airways, formed in 1930 to carry mail, passengers and freight between Fairbanks, Nome and Anchorage, and relinquished its rights to the design of the transport plane being engineered at the American Airplane and Engine plant. The Corporation then closed the factory and retained an 18 per cent interest in Roosevelt Field, Inc., leaving only American Airways and its far-flung system of airways to control.

AMERICAN AIRWAYS, INC.

American Airways, Inc., the operating company of the Aviation Corporation, ranks among the five great airlines in the United States by virtue of its vast system which extends from "Canada to Mexico and from Coast to Coast." The company was formed in 1930 and took under its management Colonial Airways Corp., Southern Air Transport, Inc., Embry-Riddle, Inc., Universal Airlines and Interstate Airlines.

These individual units and their component parts had been flying mail and passengers almost from the very beginning of air transportation, but when during the latter part of 1928 and 1929 most of the airlines then in existence were combined with one of four great aviation institutions, they became part of The Aviation Corporation. Then, when American Airways was incorporated, it took under its control these companies, which, in and of themselves, are replete with historical significance and abound with the romance of the early days of air transportation.

Colonial Air Transport, Inc., was granted CAM 1 and on June 18, 1926, inaugurated an airline between Hadley Field, N. J., and Hartford, Conn., a distance of 192 miles. It operated with a Wright J4-B-powered Fokker which carried four passengers and an 800-pound payload, a Wright J4-B Stinson Detroitter, which carried a similar load, and a Wright J5-CAF Pitcairn Mailwing which carried one passenger and a 600-pound payload. During the first few months of its operations it flew 20,895 pounds of mail, 1,140 pounds of express and 4,015 passengers, many of whom only went for short sight-seeing flights. Today, American Airways has increased the schedules over this route and is flying eight round trips daily between Newark and Boston, via Hartford.

Robertson Aircraft Corp. operated CAM 2 between St. Louis and Chicago

via Springfield and Peoria, a distance of 278 miles. Employing three pilots and five mechanics and flying Liberty-powered De Havillands during the period from April 15, 1926, when service was inaugurated, to December 1 of the same year, 376 trips were made. By 1927, Robertson had added to its flying equipment and had five DH-4's, 3 Douglas, a Standard and a Waco in service and with these planes maintained an average speed of 94 miles an hour. After inaugurating a St. Louis-Kansas City route early in 1928, it was merged with *Universal Aviation Corporation*, an organization which began operating between Cleveland and Chicago on September 15 of that year. Continuing to operate as a unit of Universal, Robertson inaugurated a 600-mile service between St. Louis and New Orleans via Jackson and Memphis on April 27, 1930, and later added to its schedules, CAM 28, a 404-mile run between Omaha and St. Louis.

At the same time that Universal acquired Robertson it also absorbed Northern Air Lines, a company flying passengers and express between Fargo, the Twin Cities and Duluth. Subsequently, on June 14, 1929, Universal opened one of the first air-rail coast-to-coast services, working in harmony with the New York Central and Santa Fe railroads, and by the end of the year was flying 11,000 miles over 4,500 miles of airways. Passenger lines were operated between Cleveland-Chicago-Kansas City and Garden City, Kansas; between St. Louis and Chicago; Chicago-Kansas City and Omaha, and between Kansas City-Wichita-Oklahoma City-Tulsa and Dallas. In addition, air mail routes were operated between Cleveland and Louisville, St. Louis-Chicago and St. Louis-Kansas City and Omaha. The company had grown from an ownership of five planes, which it had in 1928, to 66 planes

which flew 1,500,000 miles and carried nearly 14,000 passengers in 1929.

Embry-Riddle began operating CAM 24, a 270-mile route between Chicago and Cincinnati on December 17, 1927. Its equipment consisted of six Waco planes, three of which were powered by Wright Whirlwind engines, two by Hispano-Suizas and one by an OX-5. In addition, one Ryan cabin plane powered by a Wright Whirlwind was also used. In 1928, Embry-Riddle carried 35,667 pounds of mail, 21,014 pounds of express and 270 passengers while flying 35,665 miles. Its equipment had been supplemented by two Fairchild's and two Monocoupe's and combining its scheduled air transport operations with its aerial service, it employed 50 persons, six of whom were pilots. In April 1929, when it was taken over by the Aviation Corporation, it was operating 34 planes which, during the year, flew 480,000 miles with more than 800 passengers and increasingly heavy loads of mail and express.

Late in 1927 *Colonial Western Airways* was formed to fly CAM 20 from Albany to Cleveland via Schenectady, Syracuse, Rochester and Buffalo, a distance of 452 miles. The Buffalo-Cleveland leg was opened on December 17 of that year and in two weeks 229 pounds of mail were carried. Operations were undertaken with three Fairchild cabin planes powered by Wright J5-CA's and a Pitcairn Mailwing, similarly powered. In 1928, operating over the entire route, Colonial Western carried 45,309 pounds of mail, 243 passengers and 282 pounds of freight, flying 184,308 miles. It employed 37 persons, including nine pilots, and supplemented its equipment with an additional Fairchild, Pitcairn and a new Ford tri-motored plane. A two-trip daily passenger service was inaugurated between Buffalo and Toronto in June,



Top:—First of a fleet of high speed Lockheed Orion planes for American Airways.
Below:—The 15-passenger Curtiss Condor used on the New York-Chicago route

1929, and on July 15, mail was also being transported. In October, 12,557 pounds of mail were carried.

Canadian Colonial Airways, Inc., inaugurated its service on October 1, 1928, and, operating under FAM 1, flew between New York and Montreal, with four Fairchilds and two Pitcairns. During its first year it employed a personnel of 29, five of whom were pilots. In 1929, Canadian Colonial carried increasingly heavy mail loads and reached a peak of 15,278 pounds in October, an increase of more than 5,000 pounds over the first load carried.

In 1927 *Texas Air Transport, Inc.*, received contracts covering CAM 21 and 22. These routes provided a connection with National Air Transport at Dallas by reason of their 267-mile flights between Dallas and San Antonio and 283-mile flights between Dallas and Galveston. In 1928, the company omitted Dallas from its Galveston service and was flying into Laredo, and for 1929, planned eight new lines. Before it could carry out its ambitious program, however, it was merged with *Southern Air Transport, Inc.*, an organization operating three passenger routes totaling 1,334 miles and four mail routes totaling 1,634 miles. Passengers were being flown between Fort Worth-Houston, Dallas-El Paso and Dallas-Brownsville. Mail was carried on CAM 22 between Dallas and Brownsville.

May, 1928, saw the opening of CAM 23 by *Gulf Air Lines*. The original route was between New Orleans and Atlanta and with six Fokkers, one Pitcairn and a Travel Air, the company maintained mail schedules until a night passenger run between Atlanta and Birmingham was added. Early in 1929, Gulf was awarded CAM 29 between New Orleans and Houston and was still flying these two routes when it also was merged with Southern Air Transport. When 1929 came to a close, Southern Air Transport was flying CAM 21, 22, 23 and 29 over 5,936 miles of airways with 84 single-engined land planes. In a year, the company had grown from a small operator with seven planes to a corporation linking cities throughout the South with scheduled air transport.

Lack of lighting facilities delayed the opening of CAM 16 between Cleveland and Louisville, but on August 1, 1928, *Continental Air Lines* began flying over the 339-mile route with three Travel Airs, all Wright Whirlwind-powered. By the end of the year 21,354 pounds of mail had been carried, and with the consolidation of this route in 1931 with CAM 20 operated by Colonial Western Airways, American Airways was able to offer a direct airline tie-up between Louisville and Albany.

Meanwhile *Thompson Aeronautical Corp.* was creating a stir in aeronautical circles by the scope of its activities. Inaugurating CAM 27 between Bay City-Pontiac-Muskegon and Chicago in July, 1928, Thompson quickly extended its services. By May, 1929, it offered the first trans-lake scheduled air passenger service between Detroit and Cleveland, a distance of 91 miles, which was flown by Wright Cyclone-powered Loening amphibions on a 55-minute schedule. Previously, in April of the same year, CAM 27 was extended to include a Bay City-Cleveland night run while a night service was offered between Chicago and Kalamazoo.

In July 1929, Thompson inaugurated passenger service on a day schedule covering most of the principal cities of Michigan and two months later express was also included over these routes. At the end of 1930, the company had logged over 756,000 miles, had added several more cities to its schedules and constructed a repair station at Pontiac to overhaul and condition its planes. On Armistice Day, 1930, the citizens of Detroit and Buffalo were given something else to cheer about when Thompson opened service between these cities.

During 1931, Thompson created an operating division known as Transamerican Airlines Corp., to coordinate its mail, passenger and express services. R. C. (Tex) Marshall, who previously had been vice-president and general manager of the Thompson company, was placed in charge of the airline as president. Transamerican maintained its services over CAM 27 serving 18 cities in Ohio, Michigan, Indiana and Illinois. Its mile-

age was increased in 1931 from approximately 60,000 to more than 150,000 miles monthly, traversing its original routes with fast, frequent service between Detroit-South Bend-Chicago and Detroit-Toledo-Cleveland, the latter succeeding the direct 55-minute Detroit-Cleveland amphibion service, suspended for winter operations. This unique service, the world's first inland amphibion line, enjoyed the greatest traffic in its history during 1931 with 12 flights daily between April 1 and November 8, flying 243,700 miles with 9,075 passengers, 6,529 pounds of mail and 11,462 pounds of express. The 222-day operation showed an increase of 62 per cent in passenger volume and an operating efficiency of 97.6 per cent. The winter service between Cleveland and Detroit was on an 80-minute schedule, the route lying strictly over land.

Interstate Airlines, Inc., started operations in November, 1928, with CAM 30 between Chicago and Atlanta. Seven Fairchilds, three Stearmans, a Travel Air and a Waco formed the fleet, while nine pilots were numbered among a total personnel of 41. In the eight weeks to December 31, Interstate carried 473 passengers and 1,076 pounds of mail with 81,024 miles of flying. After coming under the ownership of the Aviation Corp., in 1929 the company extended its mail route and included a St. Louis-Evansville line. By that time it was flying 1,576 miles a day, but passengers were carried intermittently because of poor airport facilities. Despite handicaps, planes on the line maintained a 100 per cent record for scheduled mail deliveries for 17 weeks and a 98 per cent average for the year. On April 1, 1930 a night service was inaugurated on the St. Louis-Evansville route and an additional day service from Atlanta to Nashville was begun by the company which was then known as the Interstate Division of American Airways.

Martz Air Lines, as a subsidiary of the Frank Martz Coach Company, Inc., inaugurated a passenger and express service between Newark and Wilkes-Barre, Pa., during the summer of 1930 and operated with two Bellancas and a Ford tri-motor. After a year, the line was extended to Buffalo and stops were made at Stroudsburg, Wilkes-Barre, Elmira and Dansville with service offered over a 323-mile route. The service was continued uninterrupted until the early part of 1933 when Martz Air Lines was absorbed by the Cord Corporation and made a part of American Airways.

American Airways continued the coordination of its airlines and inaugurated 1,821 miles of new lines in 1931. Three additional round-trip schedules were inaugurated between New York and Boston, making a total of six round-trips a day. New daily round-trip ser-



Artist's conception of American Airways' new building at Fort Worth, Texas

vices were opened between New York and Cleveland, St. Louis and New Orleans, Louisville and Fort Worth, Dallas and San Antonio and Dallas and Amarillo. Sixty cities were served daily on this network of lines by nearly 100 planes. During that year American Airways flew more than 7,500,000 miles with close to 60,000 passengers, 15,000 pounds of express and 1,500,000 pounds of mail. It surveyed, established and operated 610 miles of privately lighted airways for night flying and 972 miles of day airways. Three completely lighted, five partially lighted and eight unlighted intermediate fields were established privately along its southern routes. Two-way radio communication between planes and ground stations was operated over 6,000 miles of airways; 13 radio telegraph stations, 44 teletype stations and 50 weather stations were installed and the construction of a 200 by 120 foot hangar designed for shops and offices improved the Chicago base.

The year 1932 saw American Airways take first place among the domestic air line operators for the total mileage of routes flown, ranking second in total miles flown during the year because some of its routes were flown during the day only or with one or two round-trips scheduled daily. Sixty-three cities were now being served directly and among important changes in schedule and service made during 1932 was the inauguration of a night flight in each direction between Dallas and Los Angeles providing an uninterrupted service from Cleveland and Columbus to Los Angeles.

With the acquisition of Transamerican Airlines by Mr. Cord late in 1932 and the absorption of Martz Airlines, American Airways took a firmer hold on its title as first in the total mileage of routes.

Sensing the need for faster service and the desire of air passengers for greater comfort in transport equipment, American Airways purchased some of the most modern planes for 1933 usage. Among these are the fifteen-passenger Wright-powered Curtiss Condors, P. & W. Wasp-powered Lockheeds and Lycoming-powered Stinsons, with cruising speeds ranging from 125 to more than 200 miles an hour. American Airways, thus equipped, was able to carry more passengers during the early months of 1933 than ever before, and in August alone 14,397 passengers were transported by its various divisions.

With the Cord Corporation in control, in March of this year offices of American Airways were moved from New York and St. Louis to the municipal airport in Chicago where, in the former Century-owned hangar, all executive and auxiliary activities are conducted.

Thus we find that in American Airways we have all the historical background and aeronautical interest associated with the earliest days of American



Top:—Passengers boarding an American Airways Stinson Airliner, Model U. Center:—The new Vultee V-1 transport in full flight. Below:—One of the newest Stinson products, the SR Reliant, a four-place cabin monoplane powered by a 215 h.p. Lycoming engine

air transportation. Its history dates back to 1925 when air transport first became an independent actuality; through the financial and other troubles of 1926 and 1927; into 1928 when air transportation became a major industry; through 1930 and 1931 when the airlines entered a new era under the McNary-Watres act; to 1932 when the pace for the entire aeronautical industry was set by the airlines with reduced fares, faster equipment and schedules which made possible a trip from coast-to-coast in "one business day." On its record for 1933 thus far American Airways can be rightfully proud. It has carried more passengers, flown more miles than ever before, and provided a service which is one of the outstanding achievements of the aeronautical industry.

The executive personnel of American Airways, Inc., includes: Lester D. Seymour, president; R. C. (Tex) Marshall and C. R. Smith, vice-presidents; T. J. Dunning, treasurer, and R. S. Pruitt,

secretary; L. B. Manning is chairman of the board of directors.

STINSON AIRCRAFT CORPORATION

As you fly over the Stinson Airport at Wayne, Michigan, soon after passing the city of Detroit, you see on one side of the spacious field a huge building displaying the name "STINSON AIRCRAFT" on its roof. Underneath that roof is one of the most modern aircraft factories in the country where line production methods are employed in the manufacture of a complete line of cabin monoplanes.

The early history of the Stinson Aircraft Corporation is knit closely about the personality and flying genius of the late Edward A. (Eddie) Stinson, "Dean of American Pilots," whose experiences and exploits during the decade prior to 1925 had brought him fame as one of



A Stinson on skis taking off for Point Barrow during the Wilkins Arctic Expedition to the North Pole in 1927; a Stinson Junior on floats and a Stinson Detrouiter completing the inaugural flight over the Shanghai-Nanking air mail route in 1929

the world's greatest commercial fliers.

During the years between 1920 and 1925, he formulated in his mind the "ideal" plane for the private flier and in 1925 he convinced a group of Detroit capitalists that his ideas were sound and the Stinson Airplane Syndicate was formed. Thus was built the first cabin plane featuring brakes, electric starters, inherent stability and heaters—innovations considered, but not until then put into actual practice. When production finally got under way in 1926, one of the first shipments of these five-place Stinson biplanes went to Northwest Airways which took three for its transport activities in the north, to Florida Airways, first contract air mail operator in the United States whose line ran from Atlanta to Miami and to the Wilkins Arctic Expedition.

Due to the ever increasing public interest, unprecedented activity was evident in the development of commercial airplanes and in 1927, the company now known as the Stinson Aircraft Corporation, introduced cabin monoplanes of the single-engine type designed to carry passengers and mail. Manufacture was conducted in a plant at Northville, Michigan, where, with 200 persons at work, it was possible to turn out ten planes each week. That year Eddie Stinson added to his fame by winning the National Air Tour with a Stinson Detrouiter, a plane which later was destined to monopolize the front page of newspapers the world over.

Edward Schlee and William Brock obtained this plane with slight modifications and a new engine, and took off from Harbor Grace on August 26. On September 14 they landed at Tokyo, Japan, after flying 12,295 miles across the Atlantic, Europe and Asia. Meanwhile, Ruth Elder and George Halde-man were preparing another Stinson Detrouiter for a flight to Europe. After taking off on October 11, they came down to be rescued at sea, but not until they had recorded the longest flight over water—a distance of 2,623 miles.

In 1928, the year in which Stinson and Haldeman established a new world's endurance record in a Detrouiter, the need for expansion became apparent and plans

were made for a new 80,000 square foot factory to be at Wayne, Michigan, on an airport constructed there. Before the company could move to its larger quarters, it built close to 150 planes, 95 of which were sold to domestic and foreign concerns, among them the first planes for Mexico's first air mail service. At this time the six-passenger Detrouiter and the four-passenger Stinson Junior made their debut and the company underwent a reorganization which placed Edward S. Evans at the head of the board of directors while Eddie Stinson was elected president.

The next year, 1929, was to witness a period of intense Stinson activity. After moving into its new quarters, the company produced in rapid order, the SM-2AA, SM-2AB and SM-2AC, all four-place cabin monoplanes powered by engines of varying horsepower. The SM-1F, a six-place cabin monoplane powered by a 300-horsepower engine and the SM-6B, an eight-place cabin plane also were placed on the market within a short period. An export order from China attested to the far-reaching appeal of the Stinson plane which was shipped for use over that government's first air mail line which operated between Shanghai and Nanking.

About this time, many intrepid fliers were seized with the desire to break the endurance record. Robbins and Kelly had remained in the air for 172 hours and 32 minutes and their feat had attracted considerable attention throughout the world. The reliability of plane and engine were no longer questioned, but the wish to ascertain just how long they would function sent pilots and refueling crews to airports all over the country.

Byron K. Newcomb and Roy L. Mitchell chose a Stinson Detrouiter and christened it "City of Cleveland." On June 28, 1929, they took off from the municipal airport in Cleveland and after remaining aloft for eight days came down with a new world's endurance record of 174 hours.

A Stinson plane again featured the news when it was disclosed that H. H. Culver, president of the National Association of Real Estate Boards, had been using two planes of the Detrouiter type for

business purposes. During the year, Mr. Culver logged 100,000 miles and visited 650 cities.

Early in 1929, Stinson officials sought means to reduce production costs so that quantity could be increased and quality improved. They also recognized that more working capital was required to permit more advanced engineering and experimentation as the competitive aircraft business was passing into stronger financial hands.

The earlier acquaintance of Mr. Stinson with E. L. Cord resulted late that year in the acquisition of the Stinson corporation and provided it with added engineering skill, manufacturing resources, financial strength, buying power and experienced management. Eddie Stinson was chosen president and remained as it head until his death culminated a flying career dating back almost twenty years during which he flew more than 1,500,000 miles.

The Stinson company next startled the aeronautical industry by introducing a four-place cabin ship to sell for \$5,775, as compared with a previous price of \$11,000. The new price was based upon the belief that as the public learned of the safety, comfort and ease of flying, the demand for a dependable ship would quickly justify the price. The Cord Corporation, through Mr. Cord, was beginning a campaign to educate the public in the advantages of transportation by air. Stinson always had held a place in the front rank as a builder of cabin airplanes, but the value of this particular airplane, at its startling low price, gave it a dominating position in this field.

As early as 1926, Mr. Cord and L. B. Manning were planning to develop a transport plane which could be purchased at a price which would permit fares to be lowered, thereby attracting greatly increased public patronage. The first of these planes, known as Cormon, was completed in 1928, but it was redesigned and revised and was again tested in 1929. With the purchase of the control of the Stinson company, this plane, which Mr. Cord and Mr. Manning had developed, was produced in 1930 as the Model "T" Stinson Airliner under the direction of Stinson engineers. The ship, an 11-

passenger monoplane, powered by three Lycoming engines, was the largest of its type ever produced by the company. Stinson then paved the way for a new era in airline transportation by offering tri-motored planes for \$25,000 as compared to previous prices of tri-motored equipment from \$60,000 to \$75,000. In cooperation with the Ludingtons of Philadelphia, Stinson offered the first frequent schedules—every hour on the hour—at railroad rates. Operating with Stinson planes and without the benefit of air mail subsidy, the Ludington line made a profit in its first year of operation.

Throughout 1930, Stinson continued the production of the Stinson Junior series of four-place cabin monoplanes powered by the Lycoming engine, also manufactured by a Cord subsidiary. In addition, the Stinson Detroit with accommodations for six, and the SM-6B with room for eight, also were produced.

Additional space became necessary in 1931. The construction of an addition to the factory and a service hangar adjacent to the original factory provided space for the engineering department, motor division and stock room and gave the company an additional 100,000 square feet of floor space. Production was concentrated on the Model T, which by this time was being used by Trans-american Airlines, Pennsylvania Airlines, Century Air Lines, and Century Pacific Lines, Ltd., in addition to Ludington Airlines. How the Stinson trimotor kept pace is best indicated by the fact that in 1931, one year after its introduction to the industry, more than 70 per cent of all tri-motors sold in America were Stinsons.

Early in 1932 a new Stinson trimotored plane known as the Model U was placed on the market. It combined all of the experience gained in the millions of miles of operation of the Model T and offered, at no additional cost, faster cruising speeds, greater payload, additional comfort for passengers and pilot, more power and lower maintenance and operating costs. As a result more than 90 per cent of all American tri-motors delivered were Stinsons. Stinson also supplemented its Model S, a four-place cabin monoplane of the Junior series with a new model known as the Model R. This plane was powered by a Lycoming engine of 215-horsepower, but its variations, the Model R2 had the 240-horsepower Lycoming and the Model R3 featured a retractable landing gear.

The outlook for the corporation at the beginning of 1933 was better than at any time during the two previous years. More people were employed and work was being pushed to facilitate delivery of the Model U transports. A large overhauling and rebuilding program was under way for operators of Stinson

equipment and officials were optimistic over the development of a considerable export business. Early in the year the SR Reliant was placed on the market at a new all-time low price of \$3,995. It is a four-passenger high-wing monoplane of the cabin type, powered with the improved Lycoming 215-horsepower engine. Production is expected to start on a new 10-place airliner, known as the Model A, a de luxe, high-speed trimotored monoplane featuring club-car comfort and low initial and operating costs. Into this new plane will be incorporated all the reliability and maintenance lessons learned in operating previous Stinson Airliners more than 15,000,000 miles.

The corporation has also received orders for special planes for foreign governments and is in production now on a four-purpose military plane which is destined to find considerable market outside of the United States.

Responsibility for the activities of the Stinson Aircraft Corp. rests upon L. B. Manning, president; B. D. DeWeese, vice-president and general manager; W. A. Mara, vice-president; C. R. Stocke, treasurer; R. S. Pruitt, secretary and R. W. Ayer and J. C. Kelly, Jr., transport engineer and sales manager respectively. Mr. Cord is chairman of the board of directors.

LYCOMING MANUFACTURING CO.

The Lycoming Manufacturing Company, founded in 1908 as the Lycoming Foundry and Machine Company, was formed to transact a general foundry and machine manufacturing business. Its first plant was a building previously used for the manufacture of sewing machines and its initial contract for the manufacture of gasoline engines did not arrive until 1912 when it was commissioned to manufacture and assemble about 100 Velie-designed engines. Three years later the company marketed an engine of its own design and, with a responding market, was soon assured of success.

A reorganization and refinancing took place in May, 1920, when the name was changed to Lycoming Motors Corporation. Then in 1923, the corporation purchased the capital stock of the Spencer Heater Company, and in 1924, the name was again changed to the Lycoming Manufacturing Company. Another reorganization was necessary in 1926 and more capital invested to take care of the added business.

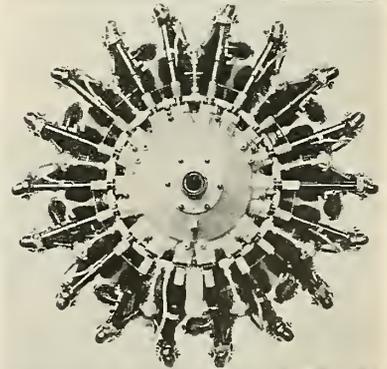
At the close of 1928 the company had assets which exceeded \$5,000,000 and was the largest producer of straight-eight automobile engines in the world. In

addition, it was also producing a full line of four- and six-cylinder automobile and truck engines. During that year more than a half a million dollars was expended on new equipment and the entire method of machining and assembly was changed throughout the factory, with the most modern machinery being added in every step.

During the year 1929, preparations were made for the greatest activity that the company had experienced. A line of marine engines ranging in size from 40- to 325-horsepower was developed and, at the same time, plans were being completed for production deliveries of aircraft engines. Initial orders for three thousand marine engines were received and substantial orders for aircraft engines were on hand to assure capacity production in this department for some time.

In 1927, the Lycoming Manufacturing Co., became a subsidiary of the Auburn Automobile Company, when the latter acquired 62½ per cent of its existing capital stock. In 1929, following the organization of the Cord Corporation, the latter acquired a large block of Auburn stock and the remaining 37½ per cent of the common stock of the Lycoming company, which then began the development of its first aircraft engine. Known as Model R-680, the engine attracted considerable attention because of its smoothness and quietness of operation, and it was granted an approved type certificate with a rating of 215 h.p. at 2000 r.p.m. Its proven dependability and reliability made it an ideal engine for transport purposes and it was not long before the Lycoming engine made its appearance on airliners flying over many parts of the country.

The production of the Model R-680 has been continued up until the present time, but during the latter part of 1931 the 240-horsepower Model R-680-BA was developed to meet the demand for increased speeds on transport lines. The new engine, described in the May, 1932,



The 240 h.p. Lycoming R-680-BA

issue of AERO DIGEST, was identical in its basic design to the Model R-680. The same bore and stroke was maintained, but the compression ratio was increased from 5.3 to 1 on the R-680 to 6.5 to 1 on the R-680-BA.

The R-680-BA engine was granted approved type certificate No. 81 on March 29, 1932, with a rating of 240 h.p. at 2000 r.p.m. With the increased compression ratio on this engine, 80 octane fuel is required.

The present executive personnel set-up includes W. H. Beal as president; F. M. Bender, vice-president and general manager; H. V. Beach, treasurer; R. S. Pruitt, secretary and Z. H. Whiteman, Jr., sales manager. Mr. Cord is chairman of the board of directors.

SMITH ENGINEERING COMPANY

The demand for better performance of aircraft through decreasing the distance for landings and take-offs as speeds were increased, brought aircraft engineers face to face with a new problem. Propellers, designed to be satisfactory for the high performance which aircraft rapidly attained, cause exceedingly poor take-off characteristics. While experiments had been conducted for some time, it was not until late in 1931 and 1932 that a solution apparently had been reached in the results obtained by the use of controllable pitch propellers.

Among the companies producing such equipment was the Smith Engineering Company of Cleveland, Ohio. The Smith propeller used the motive power supplied by the rotation of the hub around a special control worm, mounted in the thrust-bearing cover plate to actuate the change of its pitch while in flight. By changing the pitch of the blades at will, it was possible to obtain a shorter take-off run, increase the rate of climb and increase the speed at altitude. As an exclusive feature, the Smith company offered the possibility of obtaining an infinite number of blade settings, from the cockpit, with the engine running on the ground or in the air. This latter feature further makes it possible to take full advantage of engines supercharged to maintain power at altitude. The propeller pitch can be increased as the altitude increases to compensate for the decrease in air density and thus keep the



Admiral Byrd and the Antarctic Curtiss Condor equipped with three-bladed Smith controllable pitch propellers

engine speed constant, taking full advantage of the supercharged characteristics. Its acceptance was assured after tests by the Army and Navy and after Maj. James Doolittle flew his Gee-Bee Sportster with one of these propellers to a new world's land plane record at the 1933 National Air Races. Further prominence came to the Smith product when Wiley Post completed his flight around the world in record time with the aid of a Smith controllable pitch propeller. Last month tests were made of the twin-motored Curtiss Condor to be used by Admiral Byrd on his Antarctic expedition. This ship, equipped with twin floats as a seaplane, and 3-bladed Smith controllable-pitch propellers, showed a performance that exceeded that of any other seaplane of its size. Details of these tests will be found in another part of this issue of AERO DIGEST.

The mechanism of the Smith propeller, described in the November, 1932, issue of AERO DIGEST, is simple and ingenious. It is controlled from the cockpit by a small push-pull lever connected with a non-rotating sleeve in the thrust bearing cover plate. On each end of the sleeve is a worm thread. By means of the lever, this sleeve can be shifted forward to increase the pitch of the propeller or rearward to decrease the pitch.

In 1933, the Cord Corporation purchased all of the capital stock of the Smith Engineering Company and arranged with the Lycoming Mfg. Company to manufacture the Smith propeller. Subsequently the plant was moved from

Cleveland to Williamsport, Pa., the home of Lycoming, and the engine company prepared to turn out the propellers in two and three-bladed models. Following the purchase of the Smith company, new officers were elected, who are W. H. Beal, president; P. G. Kemp, vice-president, and R. S. Pruitt, general counsel and secretary. The board of directors was reconstructed, and Mr. Cord took his place as chairman, with L. B. Manning, Beal, Pruitt and R. A. Hock as members.

With the added facilities of the Lycoming company, production of the Smith controllable pitch propeller is expected to be greatly increased and wide use of it on transport and private planes is anticipated.

AIRPLANE DEVELOPMENT CORP.

The Cord Corporation formed the Airplane Development Corporation to develop the Vultee, a low-wing, all-metal monoplane designed for transport use. The new plane, known as the V-1 Transport (described in the April, 1933, issue of AERO DIGEST) was engineered and constructed at the Grand Central Air Terminal in Glendale, Calif., and made its first successful test hop on February 19, 1933, when it showed outstanding performances in top and cruising speeds.

Provision has been made for eight passengers and two pilots and particular attention has been given to soundproofing as a result of which the decibel count in the cabin is less than on an express train.

Designed for transport use, particular attention has been given to ease of inspection and low maintenance costs.

The plane is powered with a Wright Cyclone F-2 developing 712-horsepower at 1,900 r.p.m. A Smith controllable pitch propeller is used and sufficient gasoline tankage for a range of 800 miles is provided. Performance figures for the V-1 Transport show a top speed of 225 miles an hour, a cruising speed of 195 miles an hour and a landing speed of 65 miles an hour. With the addition of flaps, landing speed is expected to be lowered.

The president and general manager of the Airplane Development Corporation is Don P. Smith, and Gerard Vultee is vice-president and chief engineer.

STANAVO



AVIATION GASOLINE
AVIATION ENGINE OIL
ROCKER ARM GREASE

ECONOMICAL

LOCKHEED



Lockheed scores again! American Airways take six new Lockheed Orions. » In any consideration of new equipment the economy of a Lockheed cannot be overlooked. » The new Orion — by proof — is less expensive to buy... to use... and to operate per passenger mile. It is as economical as it is fast, cruising in American Airways' service at 206 m.p.h.

LOCKHEED AIRCRAFT CORPORATION
Burbank, California

PRIVATE FLYING

More Than 100,000 At Air Pageant

ONE OF THE most interesting air events ever held in the east came to a close at Roosevelt Field, Mineola, N. Y., after more than 100,000 persons witnessed the two-day National Air Pageant held there recently. A cross-country night flight, treasure hunt, speed dashes, attempts at world records, stunts, precision flying, mass parachute jumps and performances by the Marine and Air Corps planes featured the program. In addition special performances were given in gliders.

Among the special performers was Al Williams, who flew his Bristol Jupiter Hawk through a series of stunts; Major Ernst Udet, who put on an exhibition of acrobatic and inverted flying; George Burrell, who looped, dived, climbed, stalled and pylon-turned a tri-motored Ford; Clem Sohn, who made a delayed parachute jump of 10,000 feet; Capt. Richard Granere, who executed a series of "crazy flying" maneuvers and the Airaces, a team of fliers who individually and collectively merited applause.

Art Davis won the twenty-five mile, five-lap race in a Waco; Johnny Livingston won the Baby Ruth Trophy in a Howard Racer and Montgomery J. Chumbley took the trophy and cash prize for winning the cross-country night flight in a Waco. In the amateur events, Mrs. Cecil W. Kenyon of Boston won the national championship crown for the women's division and William Zelcer of New York, the men's.

In the attempts at world's records, Jimmie Wedell failed by less than 2 miles an hour to exceed his own mark of 305 miles an hour, but Major Alexander P. de Seversky flew a ship of his own design, the SV-1, at an average speed of 177.79 miles an hour for a new record in the amphibion category. This mark lasted less than a day, for de Seversky bettered it on his next attempt when he reached a speed of 187.8 miles an hour.

The treasure hunt was won by P. J. Sonos, of Haines City, Fla.

Sixteen Planes Make Air Tour

THE SIXTH annual Arkansas Air Tour was successfully concluded after a two-day flight during which six cities were visited by 16 planes. The outstanding feature of the tour this year was the Aerial Treasure Hunt and the Bombing Contest.

Briefly, there were four targets located within a reasonable distance of the line of flight of the tour. In order to find the location of each target, it was necessary for the pilot to decipher the clew given at the time of take-off for that particular leg of the tour. On finding the target

each pilot dropped three bombs, which were scored by a ground crew.

A banquet at Hot Springs concluded the tour, at which time it was announced that Kenneth Garrett of Pine Bluff had won the bombing contest.

O'MEARA SETS LOOP RECORD

A NEW world's record for consecutive loops in a glider was set by Jack O'Meara at the National Air Pageant, Roosevelt Field, Mineola, N. Y. After gaining considerable altitude O'Meara made 46 consecutive loops to beat the old mark of 35 held by Russell Holderman.

Pinchot to Campaign from Airplane

IN A little more than two months' training, Governor and Mrs. Pinchot of Pennsylvania have flown more than 2,000 miles and expect to make their next political campaigns from the air. The governor, it is reported, expects to run for United States Senator after his gubernatorial term expires next year, while his wife will run for the House of Representatives.

Ehlinger Chosen A. A. P. A. Governor

STANLEY J. EHLINGER of Tulsa, Okla., has been appointed governor for Oklahoma of the Amateur Air Pilots Association, Inc.

Pilot Groups to Hold Joint Fete

EVERY ACTIVE air pilot's organization is cooperating in holding a national conclave aviators' dinner and show on Armistice Night. Among the groups participating is the Aviators' Post, American Legion; Quiet Birdmen; Air Reserve Officers' Association; New York National Guard Air Service; Amateur Air Pilots' Association; Ligue Internationale des Aviateurs; Early Birds; Sportsman Pilots' Association and the Professional Pilots' Association.

The dinner will be featured by a group of sketches written, staged and acted by aviators, among whom are Clyde Pangborn, George Haldeman, Roger Q. Williams, Roscoe Turner, Errol Boyd, Russell Thaw, Robert Lyons and possibly Frank Hawks, Jimmie Doolittle and Eddie Rickenbacker.

Planes Aid Flooded Areas

ONCE AGAIN the value of the airplane was demonstrated during the storms and floods in the Rio Grande Valley section of Texas. Help was speeded by air, and first to reach the devastated sections were planes of the transport companies.

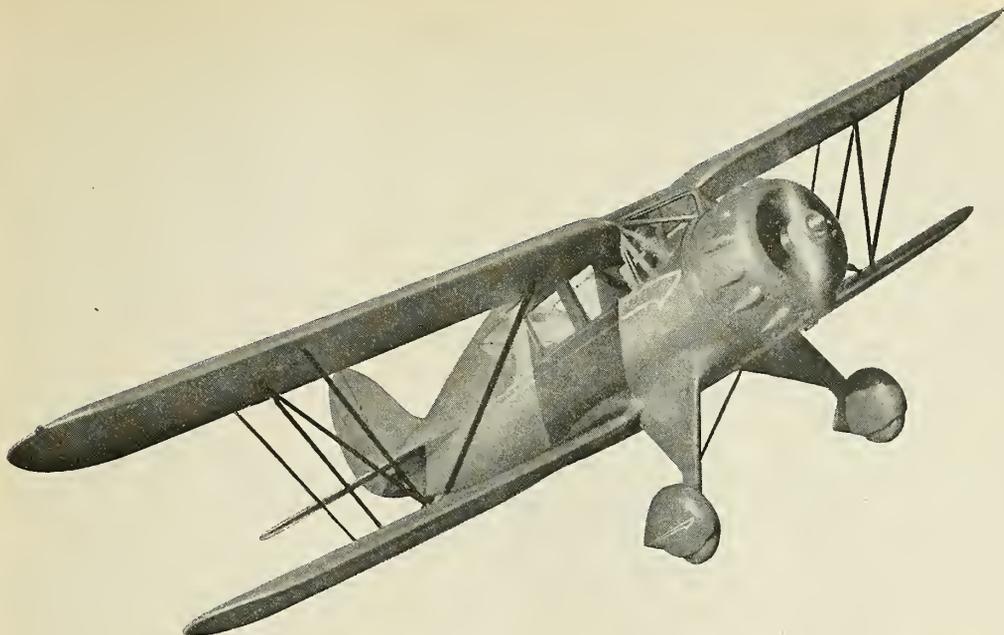
In many cases landings were made on water and physicians, medicines and supplies were available some time before the water receded.

Studies Hay Fever from Plane

A STUDY of pollen of weeds found in the air during the hay fever season was undertaken by Dr. E. L. MacQuiddy, assistant professor of medicine, University of Nebraska College of Medicine. Dr. MacQuiddy made several flights in Rapid Air Transport planes and conducted his experiments at 3,000 and 5,000 feet.



F. H. LaGuardia, New York Mayoralty Fusion candidate, flies a Waco to the Air Pageant



"YOU CAN BE YOURSELF IN A WACO, IT REFUSES NOBODY'S WHIM"

● *This advertisement was written by a WACO owner who didn't know she was writing an advertisement. It consists of excerpts from a letter written by Lady Drummond-Hay shortly after reaching England with her new WACO. We think you will agree that it is an inspired description of WACO qualities. Here is what this WACO owner says:*

"You should see them open their eyes when the WACO takes off like an eager bird, winging upward in the well-known steep WACO climb. At about 2,000 feet, I tell them to pull back the wheel, back, back—50 m.p.h.—40 m.p.h.—35 m.p.h."

"That's enough," they say.

"Not a bit of it," I retort, "back some more." Zero says the airspeed indicator. "Now hold it and take your feet off the rudders," I continue.

"Of course, they expect the ship to drop one wing and fall in a spin. But the WACO just sinks gently and quite squarely with no forward speed at all."

Flying with "hands and feet off"

"I fly the WACO Cahin 'bands and feet off' for long periods. I can take the greatest liberties with it at low speeds. In a stall, it develops no vices whatsoever. Yet its maneuverability and light controls satisfy the most inveterate stunt addict. You can fly high and fast or low and slow with equal safety. You can stunt it or load it up to the nth degree with family, friends, baggage, or sport equipment. That's what makes it everybody's ship—a ship that anybody and everybody can fly safely in all circumstances. You can be your-

self in a WACO. It refuses nobody's whim."

To an inspiring description like this, there is little that an advertising man can add except to remind you once more that you get the WACO "ready to fly—no extras to buy," and to suggest that you fly the WACO at your first opportunity.

Dealers Wanted

With WACO sales climbing steadily month after month, there is a splendid opportunity for well-qualified dealers. Write for details of the WACO franchise. You will find it a real proposition. The Waco Aircraft Company, Troy, Ohio.

\$5,985

**FLYAWAY
TROY, OHIO**



AIRLINES and AIR TRAVEL

American Airways Flies to Capital

CHICAGO AND Washington, D. C., have been joined by air service over American Airways' routes, according to Lester D. Seymour, president. The new line follows the company's present passenger, mail and express route via Indianapolis and Cincinnati then extending to Washington via Charleston, W. Va. Tri-motored Fords with two pilots, a stewardess and accommodations for 11 passengers are being used.

With the opening of the service, American Airways is traversing territory never before spanned by regular air service, the nearest approach being the Nashville division of Ludington Air Lines.

Transit time to Chicago from Washington is set at 7 hours 24 minutes, while the eastbound trip requires 6 hours 40 minutes.

Flying Sleeper Now in Service

EASTERN AIR TRANSPORT has equipped one of its Curtiss Condors with two sleeping berths and in the near future will offer sleeping accommodations for eight persons on regular overnight schedules along the eastern seaboard.

The berths were designed and installed under the direction of Capt. Thomas B. Doe, president of the company, and are 6 feet 5 inches long, 2 feet 4 inches wide and provide individual ventilators, reading lights, call buttons, clothes hangers, clothes nets, sheets, blankets and pillows.

Capt. Eddie Rickenbacker, an official of North American Aviation, Inc., of which Eastern Air Transport is a subsidiary, made the first trip over the line in one of the berths.

Fly Boston-Maine Extension

PASSENGER SERVICE between Boston, Concord, N. H., White River Jct., Vt., and Montpelier-Barre, Vt., was established by Boston-Maine Airways and Central Vermont Airways as a joint operation of the Central Vermont Railway, Boston & Maine Railroad and the Maine Central Railroad.

The new line marks the entrance of the Central Vermont company into the field of air transportation and makes it the third railroad in the country operating an airline.

Offer Milwaukee-New York Service

SCHEDULE TIE-UPS on American Airways and Kohler Aviation lines provide direct air service from Milwaukee to New York and bring the two cities within eight hours of each other.

The route follows the Kohler line across Lake Michigan to Muskegon, Grand Rapids, Lansing and Detroit

where connections are made with American Airways' planes for Buffalo and New York. Present schedules call for departure from Milwaukee at 7:35 a. m.; Detroit at 12:32 p. m. and arrival in New York at 4:19 p. m. Planes leave New York at 9:30 a. m., arrive in Detroit at 1:43 p. m. and in Milwaukee at 4:30 p. m.

AIRLINE TRAFFIC INCREASES

REPORTS FROM 24 companies operating scheduled air transport lines in the United States show a total of 63,746 passengers carried during August, a gain over the previous month despite traffic reports from more companies in July.

The reports also revealed that scheduled airlines flew 4,605,641 miles, carried 122,514 pounds of express and flew 22,489,031 passenger miles during the month.

Northwest Airways Elects President

AT THE ANNUAL meeting of the board of directors of Northwest Airways, Inc., Shreve M. Archer, president of the Archer-Daniels-Midland Co., and active in business in the northwest, succeeded Richard C. Lilly as president of the company. Croil Hunter, general manager, was promoted to vice-president and general manager, while E. L. Whyatt, assistant treasurer, replaced A. H. Daggett, who resigned as treasurer.

Changes in the board of directors in the Michigan corporation include the election of Robert Donner in place of L. B. Wakefield. In the Delaware corporation, H. H. Irvine and Mr. Archer succeeded Mr. Daggett and G. C. Tyler. Other officers and directors are: A. R. Rogers, chairman of the board; Col. L. H. Brittin, executive vice-president; H. C. Piper, vice-president; J. B. Baird, secretary. Directors are Hon. F. B. Kellogg, D. D. Davis, G. N. Dayton, F. T. Heffelfinger, J. M. Hannaford, P. J. Kalman, J. G. Ordway, L. J. Shields, R. R. Rand, R. F. Pack, F. B. Sheriff, H. H. Weesner, Wm. B. Mayo, Norman Black and Mr. Lilly.

Airlines Make Record Trips

PILOT A. W. Stainback, of United Air Lines, established a record for the flight between Salt Lake City and Cheyenne when he covered the 421 miles in 1 hour 59 minutes in a Boeing 247, low-wing all-metal plane.

Traveling at 185 miles an hour, Pilot L. Klotz of Western Air Express made the 652-mile flight between Los Angeles and Salt Lake City in 3 hours 38 minutes.

Ask Bids for Air Mail Route

THE POST Office Department is advertising for bids for carrying mails by air between New Orleans and Pilottown, Quarantine or Port Eads, La., and return in connection with outgoing and incoming mail steamers. Bids must be received at the Office of the Second Assistant Postmaster General not later than 12 o'clock noon, November 15, 1933.

Contractors, according to information from the Department, will be required, among other things, to have and maintain not less than four seaplanes or amphibians, each with not less than 700 pounds mail capacity and space enough to accommodate that amount of mail.

New High-Speed Line Proposed

A NEW airline, offering fast and frequent schedules between New York and Washington is now under discussion and plans for its inauguration are reported as nearing completion. The route of the new company will parallel that of Eastern Air Transport and will provide hourly 65-minute service in aircraft capable of cruising 200 miles an hour.

Paul Collins and Amelia Earhart, both officers of the Boston-Maine Airways, operated for the Boston and Maine and Maine Central railroads, are connected with the new venture. Collins has inspected many types of high-speed equipment and is said to be ready to spend \$250,000 for a fleet of planes.

While no definite announcement was forthcoming, it is understood that the National Aviation Corporation recently incorporated an operating unit known as National Air Lines to operate the Washington-New York service.

Open Through New York-Miami Line

A PERMANENT, year-round 12-hour service between New York and Miami is now being offered by Eastern Air Transport following speeding up of schedules along the route. The new service supplants the present service between New York and Jacksonville.

In the past, Eastern Air has provided through New York-Miami service during winter months only.

Chicago-Cleveland Service Augmented

UNITED AIR LINES has added another daily round trip between Chicago and Cleveland, bringing its schedules to the point where three planes from the east are scheduled to land at the Chicago Municipal Airport within a period of 25 minutes.

The new trip, known as the "Lark" provides departure from Chicago at 3:45 p. m. with arrival in Cleveland at 6:41 p. m. Departure from Cleveland is at 7:15 p. m., and arrival in Chicago at 8:35 p. m.

(Continued on following page)



ECONOMY!

Boeing 247 operating economy is far more than a matter of low fuel consumption! Included, besides, are the factors of high speed, extensive cruising range, low maintenance costs. The new Boeing can cruise at 171 miles an hour with a maximum range of 750 miles! Its all-metal streamlined construction makes necessary a minimum of maintenance and repair. Also, all main parts of one 247 are interchangeable with those of another — no small consideration in this

matter of economy! Exceptional strength, payload and comfort are other outstanding features. The dependable service being given, day and night, by sixty of these planes on the routes of United Air Lines proves without question that they are truly "tomorrow's transports today"! Write for detailed specifications. Boeing Airplane Company, Seattle, subsidiary of United Aircraft & Transport Corp.



BOEING *has*
always built tomorrow's
airplanes today!

(Continued from preceding page)

New Line Connects Baltimore-Easton

CHESAPEAKE AIR Ferries, Inc., of Easton, Md., inaugurated twice-daily passenger service between Easton and Baltimore on a 70-minute schedule. Stinson Junior planes are being used to make connections with Eastern Air Transport schedules at Logan Field, Baltimore. Tred Avon airport is the terminal at Easton.

A pay passenger load of 30 per cent capacity has been recorded during the first two weeks of operations, according to Malcolm L. Cleary, secretary. In addition to its passenger business, the new line also carries express.

Airline Fatalities Lower

PASSENGER FATALITIES were fewer in number than in any six-month period since July-December, 1930, according to a report by the Aeronautics Branch for the first six months of 1933. Only two passenger fatalities occurred on American-operated airlines during that time and there were 38,321,196 passenger miles flown to each fatality.

There were 48 accidents. Miles flown by aircraft of the scheduled operators totaled 25,862,120 and miles flown per accident during the period were 538,794.

Express System Makes Time Cuts

TIME SCHEDULES of the Railway Express Agency Air System have been put into effect to coordinate more closely express plane arrivals and departures with fast limited trains on railroads centering at the principal airports on the Railway Express Agency air transport system.

Direct air express schedules of the system now provide for delivery from afternoon to early evening of the same

day east of the Missouri River for shipments moved out by the noon express plane from Newark Airport and early morning delivery the next day in San Francisco, Portland and Seattle.

COL. LINDBERGH REPORTS ON AIR ROUTE SURVEY

FRESH FROM his series of survey flights in the Far North, Col. Charles A. Lindbergh reported he was greatly impressed with the possibilities of the Greenland route, but said that he could not give a final opinion until it had been flown in winter.

Col. Lindbergh is satisfied the route could run on a regular schedule in the summer, but a very good ground organization and an efficient system of directional radio and weather reports would be necessary. At least another year would be required before service was inaugurated, he intimated.

United Opens Four New Offices

ESTABLISHMENT of four new United Air Lines' offices in Texas has been announced by W. H. Philp, southwestern traffic manager. They are located in San Antonio, Brownsville, Austin and Laredo.

Texaco to Supply Gas to E. A. T.

THE ENTIRE gasoline requirements of Eastern Air Transport are being supplied by The Texas Company under a contract recently announced by J. D. (Duke) Jernigin, aviation superintendent for Texaco. The contract covers all the 24 terminals of the airline from New York to Florida.

E. A. T. Traffic Gaining

EASTERN AIR Transport carried 7,707 passengers in September, an increase of 3,461 over the same month in 1932 and for the first nine months of the year showed an increase in passenger volume of 96.5 per cent with 54,224 passengers carried.

Increased passenger revenue compensated in part for drastic reductions in air mail revenue, it was said. The company flew 3,201,121 miles in the first eight months of this year compared with 2,731,982 miles in the same period of 1932.

Bowen Enters Fourth Year

WITH A record of flying more than 3,000,000 miles with 35,000 passengers, Bowen Air Lines celebrated its third anniversary with the announcement that since the adoption of the NRA its business has shown a great increase.

Bowen is now operating between Dallas, Fort Worth, Tulsa, Oklahoma City, Austin, San Antonio and Houston.

TWA Renews Contract with Texaco

TRANSCONTINENTAL & Western Air has renewed a yearly contract for its entire gasoline requirements with The Texas Co., which is also supplying the line with lubricating oil. The contract calls for gasoline at all of the 23 TWA terminals in the country.

Hanford Joins REA Express System

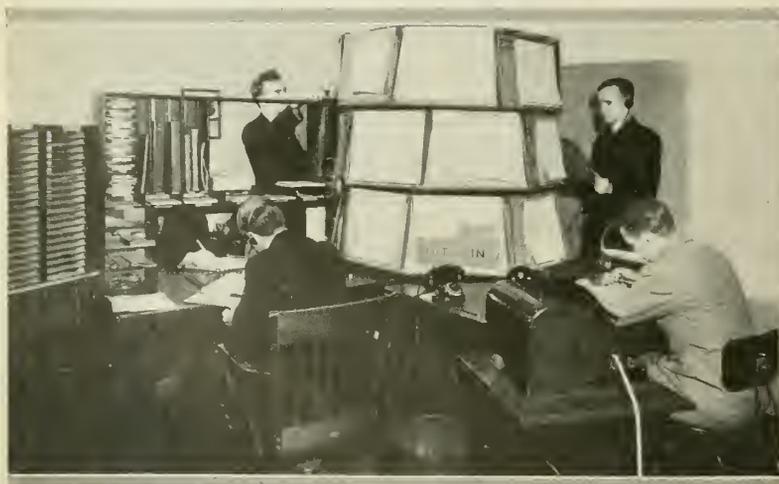
THE TOTAL mileage of the Railway Express Agency Air System was increased to 13,216 with the addition of Hanford Air Lines' routes between Omaha and the Twin Cities. At Omaha, connections are made with Rapid Air Transport and United Air Lines, both units of the REA system, and at the Twin Cities with Northwest Airways, another REA unit.

The new addition provides St. Paul and Minneapolis shippers with three air express routings to Salt Lake City.

Pan American Appoints Agent

THE INTERNATIONAL Mercantile Marine-Roosevelt Steamship Co. became general agent for Pan American Airways under a recent working agreement. Offices and agencies of the steamship firm, its affiliated companies and its ships at sea will sell Pan American tickets. Combined air and water travel may be used through the combination.

An arrangement of particular interest to air travelers is that providing for carrying heavy baggage of air passengers by steamship at the same rate as charged to steamer passengers for excess baggage. Extra luggage may be shipped ahead and held in bond at a designated port until the air passenger wishes to recover it.



Master control chart system, providing quick reference to United's Chicago schedules

Why do we stress GROUND SCHOOL performance?



FLYING was once *all* theory. No plane had ever gone up.

But since then aviation has graduated. It is equipped with an army of facts. It has for its operating standard the precision of clockwork.

These facts and this standard of performance form the foundation for all of aviation's *future* development. If the student-flyers and mechanics of tomorrow do not learn their foundation thoroughly at the start, while they are in training, they will perhaps not do so later. Certainly their chances will never be as good again.

That is why Boeing training was planned to include the *most complete ground school courses in America*. "United", the world's leading commercial aviation organization, makes it possible for young men to learn flying and learn it right.

Ask any airmail pilot or Boeing School graduate to tell you about the training standards here. Meantime, send for the illustrated Bulletin giving enrollment requirements, living advantages on the airport, the variety of courses and their costs. The coupon is for your convenience. ***Next Regular Enrollment, January 2.***

B O E I N G S C H O O L O F A E R O N A U T I C S

Division of
UNITED AIRCRAFT
AND TRANSPORT
CORP.

BOEING SCHOOL OF AERONAUTICS
Room L-11, Airport, Oakland, California

Gentlemen: I am interested in

<input type="checkbox"/> Boeing Master Pilot	<input type="checkbox"/> Boeing Master Mechanic
<input type="checkbox"/> Transport Pilot	<input type="checkbox"/> Special Master Pilot
<input type="checkbox"/> Limited Commercial Pilot	<small>(Open to holders of Transport Licenses)</small>
<input type="checkbox"/> Private Pilot	

Name _____ Age _____

Address _____

City _____ State _____

AT THE AIRPORTS

Fix Utica Field for Mail Planes

RESTORATION OF Utica (N. Y.) Municipal Airport as a regular stop by American Airways is expected soon, following completion of improvements to allow operations by transport planes.

Lengthening of runways, clearance of a large area and grading of the field has improved the airport to such an extent that approval of the field as an air mail stop by the Department of Commerce is expected shortly after American Airways decides to stop there.

United Plans Port In Pendleton

UNITED AIR Lines has decided to establish an airport in Pendleton, Ore., according to L. D. Cuddeback, vice-president and manager of the Varney Air Lines division of United Air Lines. Between \$60,000 and \$100,000 will be expended on the new airport which, when available, will save 20 minutes in flying time over the present route.

Planes are now using the field at Pasco, but in the future it is said that this city will be provided with a shuttle service operated from Spokane.

Scranton Airport Lighted

INSTALLATION of lighting facilities at the Scranton, Pa., airport has been completed, providing the field with boundary, obstruction and approach lights, two blinker beacons and a lighted windsock.

According to Harold D. Swank, airport manager, lights are available between 5.30 p. m. and 12.30 p. m., each night.

Arkansas Airport Enlarged

A DONATION of 13 acres by Frank Federer of Brinkley, Ark., has provided the local airport with enough space to extend its landing facilities to 80 acres. The airport formerly was designated as an auxiliary landing field.

Ailor Takes More Hangar Space

HOWARD AILOR, president of Waco Sales of New York, has leased Hangar 10 at Roosevelt Field, Mineola, N. Y., to provide storage accommodations for the increasing number of private owners who are making the field their flying headquarters. This is the third hangar Ailor has leased on the field since he started business, less than a year ago.

Air Service Celebrates Anniversary

A RECORD OF progress was noted in the recent celebration marking the fifth anniversary of the Flying Dutchman Air Service of Somerton Airport, Philadelphia, Pa. Starting with one plane and limited facilities, Ernest H. Buehl, manager, progressed to the point where he is one of the busiest

operators in the vicinity, flying a considerable number of planes and providing storage for many more.

On the 115-acre site there is available 18,000 square feet of storage space and 2,000 square feet of shop facilities, together with a Fairchild distributorship. An approved repair station certificate includes recognition as a service division for Wright, Lycoming and Continental engine overhaul and maintenance.

5,000 SIGN AIRPORT PETITION

AN ENGINEERING survey is being made of the cost of building a municipal airport on property owned by Westchester (N. Y.) County, following presentation of a petition signed by more than 5,000 residents asking that a field be constructed. Mayors of New Rochelle, White Plains and Port Chester, together with numerous civic organizations backed the plan which was pioneered by the Westchester County Pilots' Association.

According to present plans the airport will cost in the neighborhood of \$2,000,000, the money, if necessary to come from Federal aid which will be sought by the pilots.

Philadelphia Port Changes Hands

S. & F. AIRPORT, Inc., a division of F. & S. Aircraft Corp., has taken over the ownership and operation of Rising Sun Airport, Philadelphia, local distributor for Aeronca and Great Lakes planes. An additional workshop is under construction and the field is being scraped and rolled, providing better facilities for instruction, servicing and storage.

Joseph A. Simcock has been elected president and operations manager and Robert T. Jefferson retained as chief pilot and instructor.

North Shore Airways Changes Personnel

FOLLOWING the resignation of C. L. Clabaugh as vice president of North Shore Airways, John G. Boess was elected to fill the vacancy. Dwight Morrow continues as chief instructor in general charge of all flying operations which are conducted at Curtiss-Reynolds Airport, Glenview, Ill.

Clover Field Manager Appointed

CITY OFFICIALS of Santa Monica, Calif., have appointed Glenn Smelsor manager of the municipal airport to succeed the late Capt. Charles V. Towns.

Air Services, Inc., Chartered

THE VIRGINIA State Corporation Commission granted a certificate to Air Services, Inc., to operate a student training, aerial sight-seeing and charter operations business at Washington Airport. Officers are J. S. Wynne, president; E. B. Beasley, vice-president, and William Payne, secretary-treasurer.

The new service was formed following the sale and subsequent merger of Washington Airport and Hoover Field and takes over the flying operations of a strictly local character which formerly was conducted at both fields.

Show Success Brings Return Date

DECLARING THAT Lynchburg's first aerial rodeo held recently was a success, backers of the event announced that a similar show will be held next August during an American Legion convention in the city.

Among the winners at the last show were Dick Davidson in the spot landing contest, V. W. Burnett in the bombing contest and Dick Morgan, stunting.

Boulevard Airport Opens

APPROPRIATE CEREMONIES marked the official opening of the Boulevard Airport, Philadelphia, operated by Dick Bircher, local sportsman pilot. Jack Weyman is the flying instructor.

Moller Opens Used Parts Business

GERRY MOLLER has founded Yankee Aero Parts at the New Canaan, Conn., airport with the slogan "Don't Burn 'Em—We Buy 'Em." He will conduct a used aircraft parts business, selling all parts approved and in perfect condition.

Races Feature Port Celebration

MORE THAN 25,000 persons, including the Mayor of New Haven, Conn., and his family, watched an aeronautical program staged by Manager Jack Tweed to mark the second anniversary of the opening of the Municipal Airport.

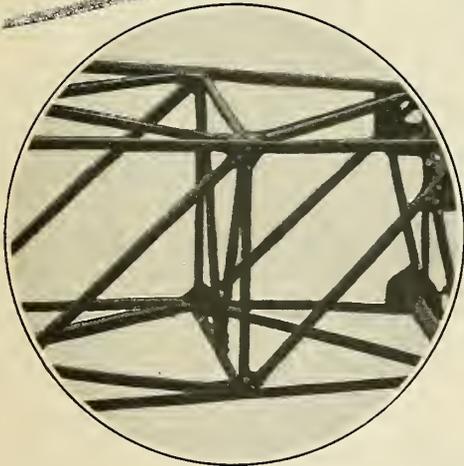
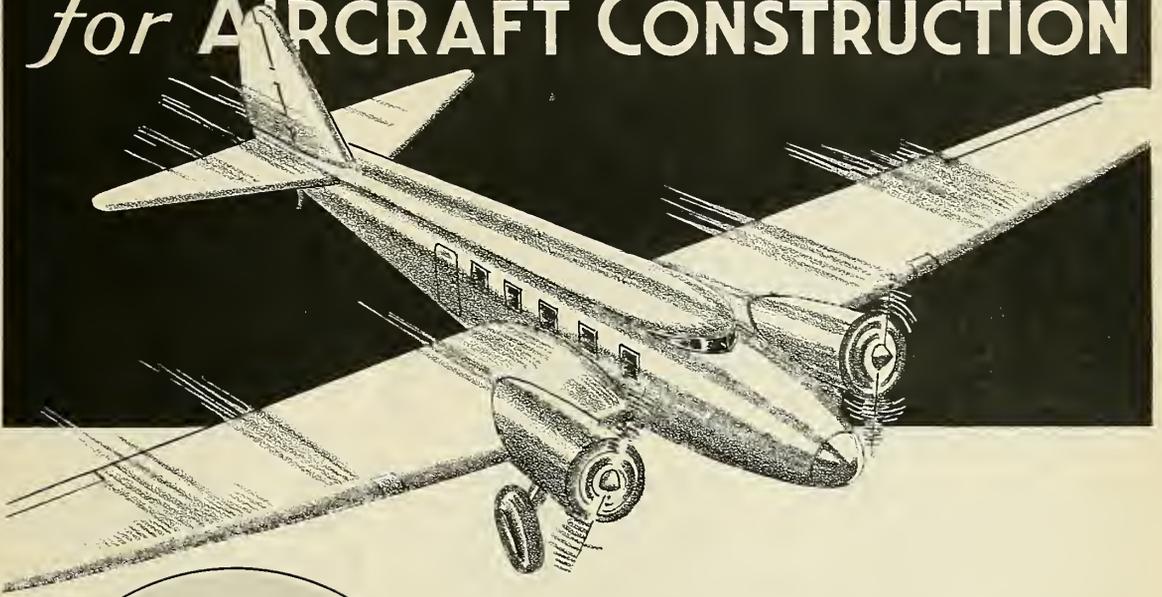
A complete program of events including a bomb dropping contest, acrobatics, gliding, races, military maneuvers and parachute jumping featured the celebration, and more than 56 planes visited the field.

Among the contestants and winners were Jack O'Meara, Luis de Florez, John Martinez, Jimmy Taylor and George W. Hard.

Establish Giro Sales-Service Unit

GIRO SALES and Service, Inc., is establishing an autogiro sales and service station at Roosevelt Field, N. Y. A section of a hangar has been leased and the company is installing complete facilities to demonstrate and service all makes of autogiros.

AMERICA'S PREFERRED TUBING *for* AIRCRAFT CONSTRUCTION



*Produced by the largest
manufacturer of tubular
products in the world*

Every resource of metallurgy, of engineering, and of manufacturing technique is employed to make NATIONAL-SHELBY Seamless Aircraft Tubing dependable to the highest degree. Accuracy, thoroughness, and vigilance govern at every point in the making and testing of this modern material. All chrome-molybdenum tubes are made from the finest quality electric-furnace steel. They conform to exacting specifications in all respects and are specified and used by America's leading designers and builders of aircraft. NATIONAL engineers will be glad to cooperate with those interested in the application of tubing to any phase of aircraft construction.

National-Shelby Aircraft Tubing is made to meet United States Army and United States Navy specifications. Carried in stock by distributors at convenient points throughout the country and kept in separate, individual lots with which actual test reports can be furnished at the time of delivery. Inquiries addressed either to the manufacturer or to the nearest distributor will receive prompt attention.

NATIONAL TUBE COMPANY • Pittsburgh, Pa.
Subsidiary of United  States Steel Corporation

NATIONAL-SHELBY AIRCRAFT TUBING

NEWS OF THE SCHOOLS

Ryan Enrolls Eighteen Students

VARIOUS SECTIONS of the United States are represented by the eighteen new students who arrived at the Ryan School of Aeronautics, San Diego, Calif., to enroll for courses ranging from mechanic's ground school to advanced transport instruction.

In addition, eight students of the San Diego Army & Navy Academy, which is affiliated with the Ryan school, are receiving aviation instruction as a part of their regular military school training. The Academy, one of the outstanding schools of its type, allows students to elect subjects in aeronautics.

Margaret Cooper Heads 99ers

NATIONAL ELECTION returns of the Ninety-Nines, national women's pilot association indicate the election of Margaret Cooper of Beverly Hills, Calif., to the presidency. Gladys O'Donnell of Long Beach, Calif., and Laurette M. Schimmoler, Glendale, Calif., were elected vice-president and secretary-treasurer respectively.

High School Gives Night Course

A SPECIAL ground course is being given at the Paul Hayne High School, Birmingham, Ala., during the evening sessions. Patterned after the regular Army ground course, the curriculum includes 40 hours of theory of flight, 20 hours of navigation, 40 hours of planes and engines, 20 of meteorology and two-hours of rigging parachutes.

S.A.E. Air Group Active

AT THE next regular meeting of the Metropolitan Section of the Society of Automotive Engineers, members will be invited to listen to speakers whose topics will be devoted to Transatlantic Air Services. The meeting, scheduled for the

evening of November 16, will be held at the Roger Kent Restaurant and will be preceded by an informal dinner.

FORM NRA AIR ASSOCIATION

THE SOUTHERN California Air Crafts Association has been formed by a majority of local non-transport aeronautical interests to administer a business code drafted in accordance with the National Recovery Administration program. In addition to its enforcement plan, the association proposes to further the cause of aviation in other directions, one of which is the defense of aviation gasoline tax refunds.

Duff Wilson has been named secretary of the association, and Louis Inwood chairman of the board of directors. Headquarters are at the Los Angeles Municipal Airport.

Boeing Closes Enrollment

A NUMBER of prospective students were obliged to postpone their enrollment in the Boeing School of Aeronautics because of the demand for reservations in the master mechanic and master pilot ground classes which began early last month. According to T. Lee, Jr., general manager of the school, the number of students in each class is limited to allow a maximum of individual instruction and to prevent overcrowding.

School Certificate Awarded

NORTHLAND AVIATION Co., operating from the Wold Chamberlain Municipal Airport, Minneapolis, Minn., has received an approved school certificate from the Department of Commerce covering its activities as transport, limited commercial, private, ground and flying school.

Students Have Aviation Day

PLAYING HOST to New York City High Schools, the Haaren High School Aviation Annex extended an invitation to every high school student to visit Floyd Bennett Field, New York's municipal airport to learn of the progress made in aviation.

An interesting program was arranged by a faculty committee of the Haaren Aviation Annex, of which Frank E. Hoffman is chairman and Major J. Nelson Kelly, manager of the airport. The students took over the management of the airport and filled such positions as airport manager, operations manager, dispatchers and airport inspectors.

The Haaren Aviation Annex with an enrollment of more than 1,500 students, houses what is said to be the largest group of aviation students.

Soaring Society Joins World Group

THE SOARING Society of America has been received into membership by Internationale Studienkommission fuer den Motorlosen Flug, the international organization linking together the national active units in the development of the art and sport of soaring. Other countries represented in the organization are Germany, Belgium, France and England.

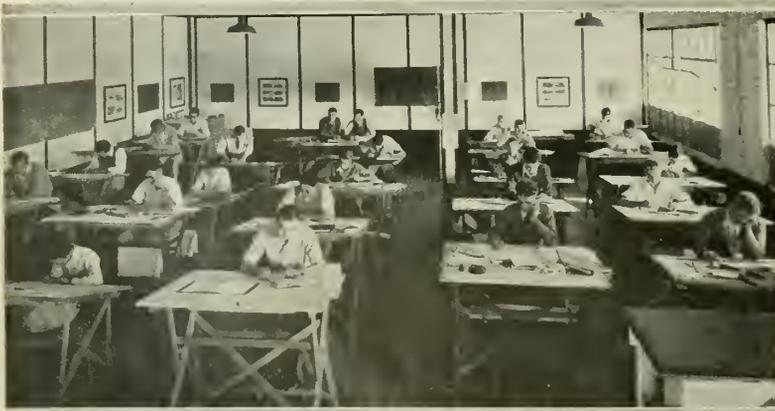
Following the recognition, it became possible to award Jack O'Meara a "D" soaring license, the highest pilot license in soaring, and first to be awarded to an American.

Roosevelt Grads in the Money

ROOSEVELT FIELD and the Roosevelt Aviation School were well represented in the winning column in the National Air Pageant. Among the graduates of the school who placed were F. William Zelcer, winner of the men's National Amateur Championship; Dave Wehman, third in the same event, and Mack Carlin, second in the bomb-dropping contest. The field's representatives who made places for themselves were M. J. Chumbley, winner of the Night Derby and Frances Harrell, who was second in the Kate Smith Trophy Race.

Michigan School Report Available

THE MICHIGAN State Aeronautics Department has completed and has ready for distribution a complete report on aeronautical instruction in public schools and also a mimeographed text on model plane building. The report and text was compiled jointly by the Aeronautical Research Committee of the Michigan Industrial Education Society and the State Board of Aeronautics and will be distributed to larger schools in the state or individuals upon request.



Training young engineers at the Curtiss-Wright Technical Institute of Aeronautics

HERE'S *Why* Aviation's finest instruction will **COST YOU LESS** at **S P A R T A N**

The Only Million Dollar Commercial Flying School in the World Government Approved

WITH a MILLION DOLLAR investment Spartan *guarantees* you every facility for sound training in any branch of aviation, but we do not stop here for we have priced the cost of Spartan Courses the lowest in the school's history. Together with this the student is offered if he desires it, **PART TIME WORK** which materially reduces his expenses while here, and **EVERY STUDENT** is given **FREE ROOM RENT**. We maintain our own Restaurant which enables the average student to spend less than \$17.50 per

month for board. **FREE** transportation is offered to and from the City of Tulsa in the schools own twenty passenger Bus. Thus living expenses at Spartan are **ONE HALF** what they would be elsewhere.

BUT WE HAVE NOT STOPPED THERE! Realizing the importance of radio in Aviation a complete Course is offered with each Aviation Course at **NO ADDITIONAL** charge, and with each Transport Course the student receives a three piece wool serge uniform, one pair American Transport Goggles and a Leather Flying Helmet.

With a Limited Commercial Course he receives a pair of Resistal Goggles and a Leather Flying Helmet.

With a Private Course he receives a pair of Resistal Goggles and a Flying Helmet.

Prepare' today that tomorrow your name will be among the leaders in Aviation—compare the School—compare your costs and then send for the Spartan catalog giving you full information about each course and how YOU may become a member of the DAWN PATROL.

COMPARE THESE PRICES

Room rent **FREE** with any course during entire period of training. Part time work if desired.

Transport Pilot's Flight and Ground Course.....	\$1,745.00
Limited Commercial Pilot's Flight and Ground Course.....	520.00
Private Pilot's Flight and Ground Course.....	375.00
Master Mechanic's Flight Course (15 hours)...	300.00
Master Mechanic's Ground Course (5 Months)...	225.00
Regular Mechanic's Flight Course (15 hours)...	225.00
Regular Mechanic's Ground Course (3 Months)...	135.00

Enroll with SPARTAN and save the difference

Spartan is now completing the manufacture of the latest order of ships for the first and second Regiments of the Mexican Army. The Official plane of the President of Mexico is a five place SPARTAN cabin. SPARTAN STUDENTS GET PRACTICAL EXPERIENCE—groups of ten each build a full size plane.



AVIATION ENGINEERING

TECHNICAL EDITORS: GLENN D. ANGLE • PROF. ALEXANDER KLEMIN • DR. MAX MUNK • DR. MICHAEL WATTER

Tail Wheel Design Considerations

ANDREW F. HAIDUCK

Chief Technician, Bellanca Aircraft Corp.

● The importance of the tail wheel on the modern airplane is often underestimated. The primary function of this component is to furnish a supporting medium for the aft end of the airplane. However, there are other considerations which must be taken into account before a thoroughly satisfactory unit can be made.

A suitable shock absorber of the oleo type is almost a necessity, primarily from the viewpoint of dissipating impact loads coincident with a normal three-point landing. An airplane which does not have a suitable shock absorber on the tail wheel is difficult to handle in taxiing, particularly on rough fields. Rebound is apt to be excessive and dangerous. If this condition occurs with a lightly loaded airplane when the center of gravity is in its most forward location, the pilot has difficulty in keeping the tail down while taxiing. A strong wind adds further danger. When a suitable shock strut is incorporated in the initial design, jolts experienced by the passengers are eliminated. However, to obtain maximum comfort and adequate dissipation of energy, the shock absorber strut must be suitable for the load to be carried. When the airplane is taxied, an oleo strut with a stiff spring will not be much better than none at all. The air and oil strut has one advantage in taxiing because the loads at that time are cushioned on air. However, this type has the disadvantage of requiring additional maintenance.

Energy dissipation characteristics of shock absorbers are well established. Still it is possible (and sometimes advisable) to check the actual load factor imposed on the structure by means of a recording accelerometer which furnishes a complete space-time record at the time of the drop test. This electrical type instrument has a paper tape attached to the structure to be dropped. An offset pencil attached to a revolving disk of known revolutions per minute inscribes loops on the tape as it moves downward. From this space-time data, accelerations and decelerations can be accurately calculated.

The size of the tail wheel is generally

established by the load requirements. As a rule this gives a suitable size for the wheel and tire combination, but sometimes a size too small for the hard rubber or micarta type with no tire. Again this latter type would be satisfactory if its use were confined to concrete or other smooth runways. On a turf field the smaller solid wheel is at a disadvantage because of insufficient bearing surface. Tail wheel structure failures resulting from this type wheel striking a frozen rut and not having sufficient diameter to roll over it, are not uncommon. Such a landing condition imposes a longitudinal component acting back on the tail wheel, a load for which it is not designed. With the proper wheel diameter a component of this character would not be imposed on the structure.

Location of Tail Wheel

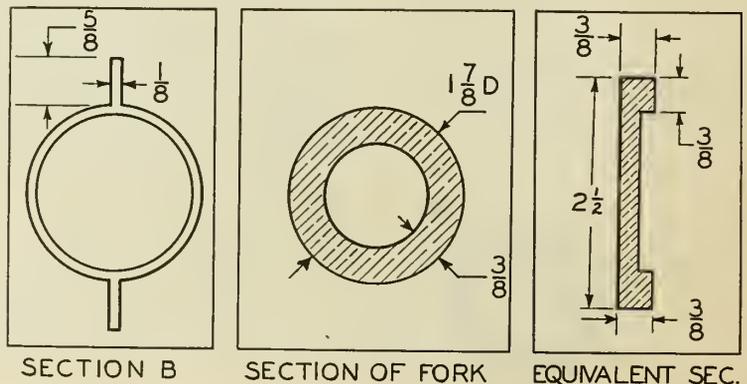
The landing gear and the tail wheel should be so located on the airplane that the tail wheel load is not excessive. Satisfactory results are obtained when the angle of the line through the center of gravity and the axle of the landing gear, with the normal to the thrust line, is 20° in side elevation. This angle can be slightly decreased if brakes are not used. The effect of exces-

sive tail wheel reaction is apparent on the take-off. Since the initial maneuver in a take-off consists in raising the tail, it is obvious that the take-off will require more time for an airplane on which the tail wheel reaction is great. On the other hand, too light a load on the tail wheel will be evidenced in the tendency of the airplane to nose over upon sudden application of brakes.

The steerable tail wheel has been almost entirely discarded with the advent of efficient brakes. However, a swivel tail wheel still has advantages in ground handling coincident with moving airplanes to and from hangars. With a swivel type a caster angle of 2° is advisable in order to maintain directional stability while taxiing.

The retractable feature in a tail wheel design is somewhat superfluous in present day commercial designs. The gain in speed observed in one typical design with retractable tail wheel was only 2.5 miles per hour. The additional weight and cost of the retracting mechanism is not justified by the slight gain in top speed. This increase probably would have been of the order of 1.5 miles if compared with the best streamlined non-retractable tail wheel.

An investigation of aircraft structural failures, made by the Department of Commerce, revealed that landing gear and tail



wheel failures composed the greatest single percentage. A careful analysis of these components is essential to insure a structurally sound landing gear assembly. With this in mind, the following tail wheel analysis is outlined as a typical investigation of the forces acting on the various parts.

TAIL WHEEL ASSEMBLY ANALYSIS

(A) Three-point landing

Resolution of forces. (See chassis analyses and fig. 1)
Load under tail wheel = $31.75/203.5 \times 5526 = 865$ lbs.

Design load factor = 7

Design; $7 \times 865 = 6055$ lbs.

1. Total moment about hinge A of tail wheel load = $6055 \times 19.8 = 120,000$ in./lbs.
2. Axial load in oleo (C-D) = $120,000/10.1 = 11,900$ lbs. (C)
3. Axial load in main compression member (B-C) of tail wheel tripod = $120,000/10.3 = 11,660$ lbs. (C)
4. Taking moments about point C. (Fig. 2)
- Moment of wheel load = 6055×9.4 in. = 57,000 in./lbs.
5. Axial tension component in tension members = $57,000/7.6 = 7500$ lbs. (T)
6. Bending moment at B in main compression member = $6055 \times 4.6 = 27,850$ in./lbs.
7. Compression component in member A-C = $27,850/15.34 = 1820$ lbs. (C)
8. Resultant stresses in plane of upper truss A_B-A_C-C and lower truss A_B-A_C-B . (Fig. 4)
9. Resultant hinge load per side truss at hinge A. (Fig. 5) (load at angle of 42° to horizontal).
10. Resultant load in member D-E, (Fig. 6)
11. Resultant load in member D-F, (Fig. 6)
12. Resultant hinge load at E, (Fig. 6) (load at angle of 59.5° to horizontal).
13. Resultant hinge load at F, (Fig. 6) (load at angle of 14.5° to horizontal).

(B) Detail Design of Members

1. Members under axial load only.
 $C = 1$ Y. P. = 60,000 lbs./sq. in.

MEMBER	STRESS	LENGTH	SIZE	STRENGTH	M. S.
A-B	+4000	22.0	3/4-.035	15970	49%
A-C	-1120	12.5	5/8-.035	3200	186%
A _u -A _l	-1300	14.5	5/8-.035	2800	115%
D-E	-11700	8.0	1/4-.049	15400	31%
D-F	+ 800	19.0	5/8-.035	14930	516%

2. Members under combined loading.
a. Member B-C.
 $P = 11,660$ lbs. (C) $M_B = 27,750$ in./lbs.
 $M_C = 0$ $L = 16"$

1. Check at end of reinforcement, $6.25"$ from B, for $2 \times .065$ chrome moly tube.
 $A = 3951$ $I/y = .18514$ $\rho = .68$
 $L/\rho = 16/.68 = 23.6$
 $M_B = 17,000$ $P = 11,660$
 $f_n = P/A + My/I = 11,660/3951 + 17,000/.18514 = 29,500 + 92,000 = 121,500$
 $fb/ft = .758$ $L/\rho = 23.6$
Follow = 157,500 for H. T. = 180,000 ultimate tension.

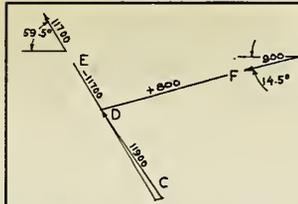


FIGURE 6

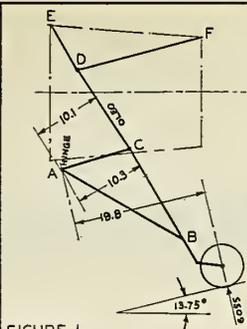


FIGURE 1

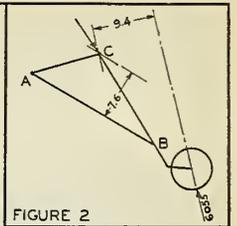


FIGURE 2

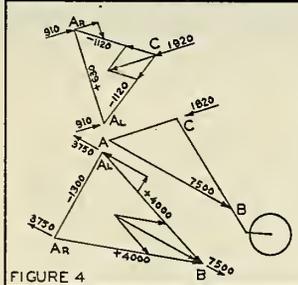


FIGURE 4

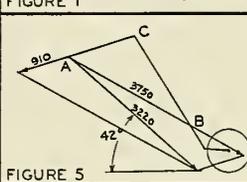


FIGURE 5

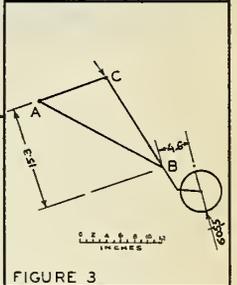


FIGURE 3

M. S. = $157,550/121,500 - 1 = 30\%$
Distance above B = $16(17,000 \times 16)/27,580 = 16 - 9.75 = 6.25"$

2. Check at B.
 $M_B = 27,850$ in. lbs. $P = 11,660$ lbs. (C)
 $A = .3951 + 2(1/8 \times 5/8) = .3951 + .156 = .5511$

$I = .18514 + 2(1/2 \times 5/8^3)/12 + .156 \times 1.31^2 = .18514 + .0025 + .268 = .45564$
 $I/y = .45564/1.625 = .280$ $P \sqrt{I/A} = .91$
 $f_n = P/A + My/I = 11,660/.5511 + 27,850/.28 = 21,180 + 99,500 = 120,680$ lbs./sq. in.

$fb/ft = .825$ $L/P = 16/.91 = 17.6$
 $FA = 174,000$ lbs./sq. in.
M. S. = $174,000/120,680 - 1 = 49\%$

(C) Tail Wheel Fork

1. Section at lower end of member B-C.
 $M_B = 3.5 \times 6,055 = 21,200$ in./lbs.
 $P = 6,055$ lbs. (C)
 $A = 1.77$ $I = .522$ $I/y = .522/.9375 = .557$

$in = P/A + My/I = 6,055/1.77 \times 21,200/.557 = 3,420 + 38,100 = 41,520$ lbs./sq. in.

$fb/ft = .918$ FA for manganese bronze casting
 $.918 (65,000 - 45,000) + 45,000 = 18,300 + 45,000 = 63,300$ lbs./sq. in.

M. S. = $63,300/41,520 - 1 = 52\%$

2. Section of fork.
 $M_B = 21,200/2 = 10,600$ in./lbs. per side
 $P = 6,055/2 = 3,028$ lbs. per side
 $A = (2 \times 1/2 \times 3/8) - 1 \times 3/4 \times 3/16 = .937 - .328 = .609$ sq. in.

$I = (2 \times 1/2^3 \times 3/8) - (1 \times 3/4^3 \times 3/16)/12 = 5.87 - 1/12 = 4.87/12 = .405$
 $I/y = .405/1.25 = .324$

$f_n = P/A + My/I = 3028/.609 + 10,600/.324 = 4,970 + 32,800 = 37,770$ lbs./sq. in.

$fb/ft = .87$
 $FA = .87 (65,000 - 45,000) + 45,000 = 17,400 + 45,000 = 62,400$ lbs./sq. in.
M. S. = $61,400/37,770 - 1 = 62\%$

Curtiss Condor with Twin Floats

• Three days of intensive flight tests were concluded on October 10th, when Admiral Byrd's Curtiss-Wright Condor was granted a seaplane license on Edo floats. The country's largest seaplane (probably the largest ship of its type in the world) demonstrated an 18-second take-off with 17,800 pounds gross load and a top speed of 149.7 miles per hour.

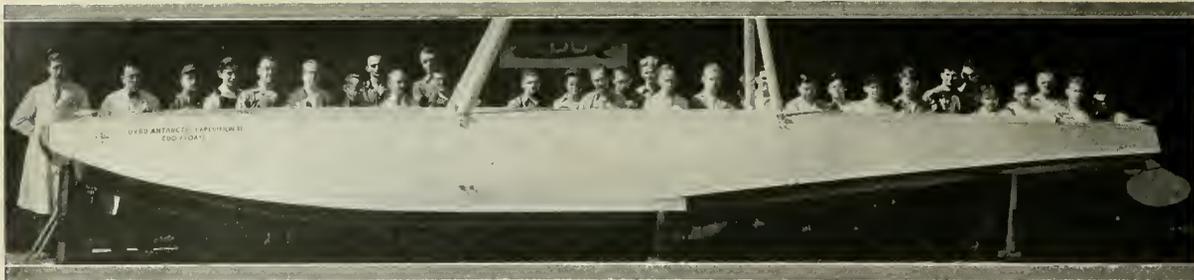
The tests were conducted at the Glenn Curtiss Airport, North Beach, Long Island, N. Y., with Harold I. June, chief pilot of the Byrd Antarctic Expedition II at the controls. Department of Commerce Inspectors Raymond Quick and Joseph Bowden were in charge of the trials, while Stanley Jacques and B. V. Korvin-Kroukovsky acted as observers for the Curtiss-Wright company and the Edo Aircraft Corp. respectively.

Admiral Byrd expects to take off in the Condor with a heavy load from the open

reaches of the Antarctic Ocean and land the ship with its floats on the snow and ice at Little America.

In view of the imminent sailing of the Byrd Antarctic Expedition it was necessary to curtail the tests and therefore experiments were made to establish the optimum propeller setting, rate of climb, etc. The following figures, therefore, are recorded as actual results in the preliminary flight tests only.

The ship, as tested, had a weight empty of 11,155 pounds, including the floats and water rudders and special equipment consisting principally of tanks and piping for 1,100 pounds of fuel. It was fitted with two Wright Cyclone SR-1820-F-2 engines rated at 710 h.p. at 1,950 r.p.m. and turning three-bladed Smith controllable pitch propellers with a diameter of 9 feet 6 inches. The blade settings in the tests ran from 16° to 19.75° at 42-inch



One of the 32-foot all-metal twin floats for Admiral Byrd's new Curtiss Condor seaplane

radius. Each float has a length of 32 feet 4 inches, a beam of 57 inches and a total submerged displacement of 16,800 pounds. Each float weighs 650 pounds, giving it a submerged displacement of 25.8 pounds for each pound of structural weight. The weight of the total float installation, including the water rudders and all struts is 1,700 pounds, which increases the total weight of a standard Condor seaplane by only 770 pounds after retracting the weight of the regular retractable wheel landing gear and tail wheel.

The type was granted a seaplane A.T.C. for a gross weight of 17,000 pounds, giving the ship a useful load of 6,645 pounds, 37.5% of its total weight. With this load, and in the face of a 12-mile wind, the ship took off repeatedly in from 18 to 22 seconds. Propeller spray during take-off was absent, the floats running clean and steady at all speeds. In fact the tendency to damp out longitudinal oscillations on the water was so pronounced that the ship was allowed to take off with free elevator controls from an idling start and left the water with the

stabilizer set for an 80-knot climb in only a few seconds more than the optimum take-off.

Speed tests on a four-mile course over Long Island Sound showed a full throttle maximum of 149.68 miles per hour at 1,890 r.p.m. and 34.25 inches of manifold pressure. Since this speed run was made before all of the streamlining had been installed and without any experimenting with propeller settings, it is expected that a speed in excess of 150 miles per hour can be attained. A propeller speed of 1,705 r.p.m. and manifold pressure of 25.5 inches, worked out a cruising speed of 123 miles per hour. Climb tests were made with a gross load of 17,100 pounds and showed a rate of 730 feet per minute, and approximately 8.5 minutes required to attain 5,000 feet. Testing single engine performance with the same load at an altitude of 1,000 feet, the ship gained altitude slightly (on either engine) at an indicated air speed of approximately 90 miles per hour. Calibration of the air speed indicator showed that the stalling speed at 17,000 pounds gross load was 63 miles per hour.

Altitude Measurement

The Acoustical Method of Measuring Altitude and Its Apparatus (Le sondage aérien—méthodes et appareils), P. Léglise, L'Aéronautique, Vol. 15, Nos. 169, 170, June and July, 1933, pp. 128-134 and 160-170, 33 figs.

THE PHYSICAL-TECHNICAL side of the problem of measuring height by means of acoustical apparatus is discussed in detail in the first article, and the causes of errors in acoustical equipment explained. This is followed and is continued in the second article with detailed descriptions and drawings of five or six recently invented acoustic equipment, four of which are French. Beginning with the acoustical apparatus of Badin-Behm, the author describes the General Electric acoustical altimeter, the equipment of Florisson-S. C. A. M., A. Nandillon, Du-bois-Laboureur, and Jacquet-Badin.

Oil Viscosity

Contribution to the Study of the Viscosity and Congealment of Oils (Contribution à l'étude de la viscosité et de la congélation des huiles), M. Bourdiol. Publications Scientifique et Techniques du Ministère de L'Air, Service des Recherches de L'Aéronautique, No. 27, 1933, 119 pp., 33 figs.

BY MEANS OF original equipment which he describes, the author was able to determine the viscosity coefficient of oils at very low temperatures. Among the oils tested at -21 degrees, he found that when castor oil remained a liquid, it was relatively less viscous than most oils of analogous consistency, and proved that formulas proposed for the coefficients of viscosity in function of the temperature were not applicable to low temperatures. He describes rapid and slow methods for research in congealed oil by means of the viscosimeter and explains a means of studying the congealment of oil with the polariscope. With the latter instrument he is able to show the principal factors in the partial congealment of oil, that is, the precipitation of the stearides, and to demonstrate that partial congealment can be stopped by clearing the oil of the solid stearides it contains. He also tells of his studies of the complete congealment of oil with the aid of the polariscope, and the curious properties he found when raising the temperature from -20 to 0 degrees.

Digest of Technical Articles from Foreign Publications

ELSA GARDNER

Aerodynamics

Vortices Produced by Jets at Very Low Speeds (Tourbillons donnés par les jets de très petite vitesse), H. Bouasse. Publications Scientifiques et Techniques du Ministère de L'Air, Service des Recherches de L'Aéronautique, No. 26, 1933, 96 pp., 45 figs.

IN DESCRIBING his experiments with non-pulsating jets of air and smoke at very low speeds, the author discusses volutes drawn out of a tube of circular cross-section for a constant-speed jet, a jet formed by an adjustable laminar nozzle, a jet of constant delivery at low speeds against an infinite plate, different volutes due to a constant-delivery jet, a vertical jet which encounters a V with horizontal ridges, and jets encountering cylinders in various positions. Under the heading of pulsating jets of air, the

author takes up spontaneous jets on a plate, formation of smoke rings, adjustable laminar nozzles and jets on a circular plate and on cylinders. He studies also imposed oscillations, an alternating jet with no average output, and puffs of gases.

Present State of Experimental Research on Vortex Rings in Gas (Etat actuel des recherches expérimentales sur les anneaux de tourbillons dans les gaz), C. Sadron. Publications Scientifique et Technique du Ministère de L'Air, No. 22, 1933, 45 pp., 19 figs.

RESULTS obtained in experiments on the formation and propagation of vortex rings in gas are reviewed and a contribution made to the experimental study of aerodynamic phenomenon at low speeds. The author recommends a blower for the experiments at low speed.

Hydro-Carbons

Application of the Raman Effect and the Ultra-violet Absorption to the Identification of Hydro-Carbons (Application de l'effet Raman et de l'absorption ultra-violette à l'identification des carbures d'hydrogène), A. Andant and M. A. Cotton. Publications Scientifiques et Techniques du Ministère de L'Air, No. 21, 1933, 76 pp., 71 figs.

DEFINITIONS and essential properties of the Raman effect are reviewed, and a brief description is given of the more simple apparatus employed by the authors and their methods of measuring. The results obtained by the authors and those previously obtained by others on the same carbons are summarized. The last part of the article is devoted to ultra-violet absorption.

Engine Lubrication

Lubrication in Oxidizing Conditions, R. O. King and C. Jakeman. (British) Aeronautical Research Committee—Reports and Memoranda No. 1517, January, 1933 (published July 20, 1933), 14 pp., 12 figs.

THE OBJECT of the experimental work described was to investigate the effect of oxidation on the lubricating properties of mineral oils used for airplane engine lubrication. Viscosity was observed to increase with oxidation, but the consequent increase of fluid friction was apparent at temperatures below 50 degrees Centigrade only. A safe region of high-temperature lubrication was attained, and experiments with various oils show that the extent of this region and life of the oil depend on oxidation characteristics. Friction was due neither to viscosity nor to the action of the absorbed layer.

The authors suggest that the active or polar molecules formed during the early stage of oxidation build up to an appreciable thickness on the absorbed layer, and the friction observed is that on the surface of the built-up layer. The surface diminishes as the thickness of the boundary layer increases, and friction approaches zero as a surface of complete slip tends to be reached.

Fuel Injection

Some Notes on the Pressure Piping Effects on Fuel Injection, C. W. Lawson. Royal Aeronautical Society Journal, Vol. 37, No. 272, August, 1933, pp. 694-702, 11 figs.

RESULTS of experiments to determine the methods of injecting fuel into the cylinders of a Diesel engine to obtain the best conditions for combustion are discussed with descriptions of the apparatus used. The author compares the loaded injection valve and the open nozzle and considers the injection valve superior for general purposes. He refers to an injection meter which measures the quantity of oil delivered by a nozzle. Although he does not give the details of the meter design, he shows the arrangement of the special coupling between the pump

camshaft and meter shaft, as well as the design of the nozzles used in the tests. He found that the amount of dribble from the nozzle is influenced by the volume of the pipe, maximum pressure determined by the pump speed and resistance through the nozzle, and the position of the non-return valve. He also concludes that the injection lag depends upon the pump speed to a small extent, is proportional to the pipe length, and bears some relation to the time taken by a sound wave to travel along the pipe.

Servo Rudders

Some Full-Scale Experiments with Servo Rudders, J. E. Serby. (British) Aeronautical Research Committee—Reports and Memoranda No. 1514, July 8, 1932 (Published August 8, 1933), 8 pp., 17 figs.

CROSS-WIND FORCE coefficients and main rudder moments were measured in the reported experiments on an all-moving rudder fitted with a hinged flap-type servo, for a range of servo positions. The maximum cross-wind force coefficient obtainable with the rudder of which the aspect ratio was 2.4, was found to be approximately 0.24 at an incidence of 14 degrees. Shielding of the rudder by the tail caused a loss of rudder efficiency of 40 percent on calculated values. The center of pressure movement was large enough to be very important in large rudders with hinge positions set well back. The servo moments were extremely small.

Turbine Wing

Construction of an Experimental Tubular Fuselage for an Airplane—Results Obtained and Program for the Future (Realizzazione dell'aeroplano sperimentale a fusoliera tubolare—risultati ottenuti e programma per l'avvenire), L. Stipa. Rivista Aeronautica, Vol. 9, No. 7, July, 1933, pp. 13-37, 25 figs.

AFTER favorable results had been obtained in experiments with a propeller operating in front of a hollow tube, the Italian Air Minister decided to build an experimental airplane of the turbine wing type. The author gives construction data for the Stipa-Caproni airplane and outlines its characteristics in flight. The hollow fuselage contains a DeHavilland Gipsy III 120-horsepower engine suspended at three points from the interior just inside the front end, driving a propeller outside. The fuselage is of large diameter compared to the span of the low wing, and is very short. Two cockpits are placed on the top of the fuselage so as not to interfere with its venturi interior. The length of the airplane is 6.04 meters, height 3.24 meters, span 14.304 meters, and wing surface 19 square meters. The author concludes with a program for further construction and future experiments to be made with airplanes containing two, three and four venturi tubes in place of a fuselage.

Paper presented before the Associazione Italiana di Aerotecnica.

Forces on a Wing

The Stability of the Static Equilibrium of the Elastic and Aerodynamic Actions on a Wing, H. R. Cox and A. G. Pugsley. (British) Aeronautical Research Committee—Reports and Memoranda No. 1509, October 3, 1932 (Published August 8, 1933), 20 pp., 2 figs.

THE FUNDAMENTAL interdependence of the aerodynamic and elastic actions on a wing are discussed and applied to the case of a wing held at its root in a steady air stream, a problem in which conditions governing the equilibrium of the wing as a whole do not obtrude. For this case the necessary mathematical theory is developed and the analytical results given are suitable for application to actual airplane problems such as those concerning wing strength for various conditions of flight, or those concerning airplane stability.

Rocket Propulsion

Principles of Rocket Propulsion, H. Chatley. Royal Aeronautical Society Journal, Vol. 37, No. 272, August, 1933, pp. 723-728. Bibliography.

THE DISCUSSION of rocket propulsion is confined to the main practical questions from a solution of which the development of long-range rockets may ultimately appear. The author derives formulas for vertical rocket flight involving a reduction of the rate of combustion so as to bear a constant ratio to the momentary weight of the rocket, and for the maximum velocity with constant thrust. He takes up the nature of the propellant that must be used and goes into the dynamics of the ordinary rocket and the energy loss in the discharged stream. He compares the efficiency of rocket and propeller in the air and emphasizes the importance of high jet velocity.

Aerodynamics

Drag and Pressure-Distribution Experiments on Two Pairs of Streamline Bodies, C. N. H. Lock and F. C. Johansen. (British) Aeronautical Research Committee—Reports and Memoranda No. 1452, March, 1933 (Published Aug. 14, 1933), 19 pp., 4 figs.

THE DATA obtained in the reported experiments are considered mainly as a contribution to the existing information on the drag of streamline bodies. The degree of turbulence present in the boundary layer was found to have a marked effect on overall drag, but no appreciable effect on pressure distribution. From this it has been inferred that the appreciable scale effect observed with a completely turbulent boundary layer was associated with a decrease in skin-friction coefficient as the Reynolds number is increased. For smooth, well-shaped bodies, the skin friction was closely the same as that on a flat plate of equal area.

Aircraft Engineering for August, 1933, contains an article entitled "The Stipa-Caproni Monoplane," which summarizes model and full-scale experimental results.

Developments in high-powered Aircraft Engines

GLENN D. ANGLE

● Before we review the progress of engine construction in the 1000 h.p. class in the United States, let us briefly note what has been accomplished in Germany and Czechoslovakia, two countries which were not represented in the high-powered aircraft engine field nine years ago.

German Engines

Dr. Rumpler of Germany prepared designs for a twenty-eight-cylinder engine several years ago and offered to license the manufacturing of it in this country. However, these offers were not accepted, and it is doubtful if actual construction was ever undertaken. Mention of this design is appropriate because it was rated 1000 h.p. at 2000 r.p.m., and it may be of interest to note that the twenty-eight cylinders were grouped in seven radially arranged rows of four each.

We have no record of any actual engine of German design with an output above 1000 h.p., although some well known manufacturers have built engines approaching and even reaching this figure. B.M.W. built at least three models which were twelve-cylinder V types of high compression delivering 750 h.p. at 1650 r.p.m. Junkers also produced similar types fitted with propeller reduction

(Part 2)

gears, one delivering 650 h.p. at 1675 r.p.m., and another giving 700 h.p. at 1850 r.p.m. This company has also created considerable interest in its opposed double-crankshaft Diesel engine, known as the Jumbo 4, which, it is reported, delivers as a maximum 650 h.p. at 1620 r.p.m. Some time ago it was reported that Siemens-Halske was developing an air-cooled radial engine to produce 700 h.p., but further details have not been made public.

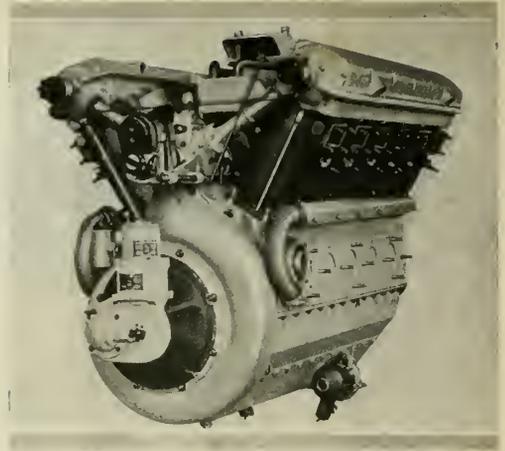
Two German manufacturers have built engines which, by means of supercharging, have delivered 1000 h.p. In 1928, the Argus firm built the As6, a twelve-cylinder V type normally rated 700 h.p. at 1500 r.p.m., and when supercharged gave 1000 h.p. at 1700 r.p.m. The same rating was given to the F-2, a similar type of engine produced by Mercedes-Benz. Recently this engine has been converted into a Diesel type with a rating of 700 h.p. at 1675 r.p.m. It also has been announced that Maschinenfabrik Augsburg-Nürnberg (M. A. N.) is developing a

1000-horsepower Diesel engine for a new Zeppelin.

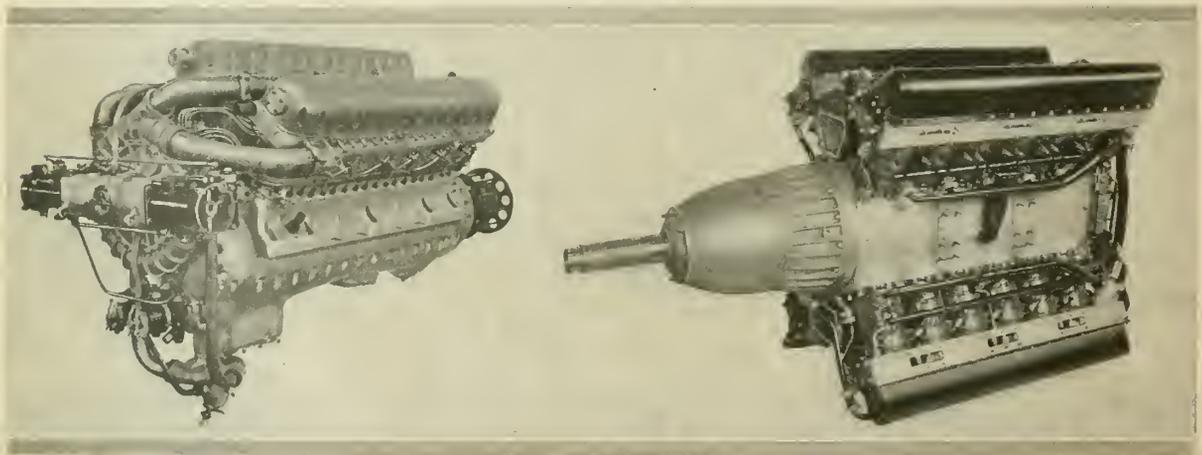
While the designs developed in Germany are noteworthy in several respects, it is evident that their efforts have not been primarily directed toward the extremely high outputs, which are so conspicuous in other countries. Perhaps one of the reasons that German manufacturers have not progressed further in this field is the restrictions placed upon them for such a long time by the terms of the Treaty of Versailles.

Czechoslovakian Engines

In Czechoslovakia we find two firms producing engines of large output. Ceskomoravska-Kolben-Danek absorbed Breitfeld-Danek, whose twelve-cylinder B. D. model was said to deliver a maximum of 760 h.p. at 1500 r.p.m. Their more recent design, the Praga, is a twelve-cylinder V type built with either direct or reduction-gear drive for the propeller. The direct-drive ESV model is rated 650 h.p. at 2000 r.p.m., and the



The 1000 h.p. German Mercedes-Benz F-2



The 18-cylinder Czechoslovakian Avia W-44 and the 24-cylinder American Packard X-2775

geared engine, the ESVR, is rated 650 h.p. at 2100 r.p.m. The Avia Aircraft Co., which has taken over the aircraft engine business of the Skoda works, builds a supercharged twelve-cylinder V type known as the V-30. This engine is rated 700 h.p. at 2400 r.p.m., and is furnished either with or without propeller reduction gears. Their W-44, an eighteen-cylinder W type, is also built in direct and geared models, and has a rated output of 1000 h.p. at 2400 r.p.m.

American Engines

We now come to the developments in this field that have occurred in the United States during the past nine years, and they do not on the whole look good in comparison with those of foreign countries. Wright built a model T-3, a twelve-cylinder V type rated 650 h.p. at 2000 r.p.m. Packard built a series of twelve-cylinder engines, the model 2200 rated 680 h.p., the first model 2500 rated 770 h.p., the model 3A2500—with direct or geared drive—rated 800 h.p. at 2000 r.p.m., and the geared and supercharged model 4A2500 rated 880 h.p. at 2700 r.p.m. The above-mentioned engines are no longer being produced. Curtiss deserves mention because the Conqueror, an enlarged and refined edition of the D-12, has shown outputs exceeding 600 h.p.

The efforts of American designers have been confined mostly to air-cooled engines during recent years, and there is no need to dwell upon the excellent results that have been accomplished in this particular field. While the author has always entertained the view that better over-all results can generally be secured in liquid-cooled engines for outputs exceeding 600 h.p., the actual proof could be convincingly obtained only by simultaneously developing an air-cooled and liquid-cooled design of the same output. In expressing this opinion, there certainly is no intention to detract from the excellent air-cooled designs of greater output that have been developed both here and abroad.

The nine- and fourteen-cylinder radial engines developed by Pratt & Whitney and Wright unquestionably compare most favorably with similar developments of 600 or more horsepower in other countries. However, we are more concerned in this study with engines of greater output, and in the air-cooled field one design exceeding 1000 h.p. has been constructed. The X-4520, rated 1200 h.p. at 1800 r.p.m., was built by Allison for the Army Air Corps. This was a twenty-four-cylinder X type, constructed, it would seem, more to demonstrate what could be done with air-cooling rather than for its usefulness in actual service. The Airex RX-10, an eleven-cylinder radial estimated to give 1000 h.p. at 1750 r.p.m., and the Universal thirty-two-cylinder design, composed of eight rows of four cylinders each, with an estimated output

of 1600 h.p., are both air-cooled types which apparently have not advanced beyond the design stage.

Returning to the developments in the liquid-cooled field, it is understood that Allison has under development at the present time a six-cylinder Diesel which delivers 900 h.p. at 1200 r.p.m., as well as a geared twelve-cylinder V type which is normally rated 750 h.p., and which may deliver 1000 h.p. by means of supercharging. Full details concerning these engines are not yet available for publication, and neither are those of the steam power plant, with an estimated output of 2350 h.p., which is being developed by Great Lakes in Cleveland. Consequently, aside from the air-cooled X-4520 engine to which we have just referred, the Packard X-2775 is the only American design with an output over 1000 h.p. to have been actually constructed, and operated in flight. This engine was a twenty-four-cylinder X type rated 1200 h.p. at 1600 r.p.m. It made its appearance during 1927 but never became a service type.

Conclusions

There is not a single aircraft engine being produced in the United States with an output of 1000 or more horsepower, neither has one been granted a Department of Commerce Approved Type Certificate. In contrast Italy claims six engines of this class, including the largest unit so far produced; France has four, Germany three, Czechoslovakia one, and while the engine manufacturers of Great Britain do not appear to be especially active in such developments at present, they have obviously done more in the past than the manufacturers of this country.

Mere size is not necessarily an index

of design progress, and we cannot for a moment assume or imply that American designers have not equalled or even exceeded their foreign contemporaries in the particular field of their activities. However, little attention has been given to high-powered units, which are as important in American military or racing airplanes as in those of other countries, and especially for the commercial transport airplane whose field of operations has no parallel. It is not within the scope of this article to deal with the pros and cons of single- versus multi-engine installation, which have been common topics of discussion among aeronautical engineers for years; but it is desired to point out the fact that upon the basis of economy alone, the high-powered aircraft engine is definitely needed, and developments in this field should be more generously encouraged.

We must conclude, from the numerous designs referred to in this discussion that the twelve-cylinder V type has been the popular choice in the horsepower range from 600 to 1000. Moreover, it is rather doubtful if the radial air-cooled engine will ever completely supplant liquid-cooled engines of this form belonging in this particular output range. At least six twelve-cylinder engines have been capable of delivering 1000 h.p., but in the opinion of the writer better results can be secured with engines of more cylinders when outputs above 800 h.p. are required. Mention has been made of engines with twenty-four, twenty-eight and thirty-two cylinders in various arrangements, but with five representative designs having eighteen-cylinders in W form, with a rating of 1000 or more horsepower, we must conclude that this type is the most popular one in the higher power range.

Recent Aeronautical Patents

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N. W., Washington, D. C.

Flying boat. Franz Kleinhenz, Berlin-Treptow, Germany (1,922,769)

Airplane. John Squires, Hagerstown, Md. (1,922,825)

Rotary airfoil. Sandor Rosenberg and Alexander Klemin, New York, N. Y. (1,922,866)

Course indicator for reproducing the indication of a gyro compass. Wolfgang Otto, Kitzberg, Germany. (1,922,976)

Propeller. Edgar R. Holmes and Thomas M. Shelton, Denver, Colo., assignors to American Gyro Co. (1,923,054)

Supporting means for aircraft-sustaining rotors. Roy W. Morse, Willow Grove,

Pa., assignor to Autogiro Co. (1,923,110)

Airplane map device. David H. Norvell, Kermit, Tex. (1,923,113)

Airplane control. Garfield A. Wood, Algonac, Mich. (1,923,290)

Airplane propeller. Jose Ostria and Ray De May, Chicago, Ill. (1,923,325)

Airplane fuel tank. Roy G. Miller, Farmingdale, N. Y., assignor to Aviation Patent & Research Corp. (1,923,384)

Airplane radiator. James A. White, Lockport, N. Y., and Harold Caminez, Indianapolis, Ind., assignors to Harrison Radiator Corp. (1,923,404)

System and apparatus for assisting navigation. Walter N. Fanning, Alameda, Calif. (1,923,430)

Torpedo for launching from a flying machine. Johan A. Bull, Horten, Norway (1,923,612)

Display in aircraft. Harry H. Haines, Akron, Ohio, assignor to Goodyear Tire & Rubber Co. (1,923,725)

The Problem of Airplane Ventilation

WILLIS L. NYE

● The rapid increase in production of transport planes emphasizes the need for improved cabin ventilation. Higher speeds and smaller frontal areas have made it necessary to limit the physical dimensions of airplane cabins. Modern transport planes provide about 22 cubic feet of cabin space per passenger, although some of the earlier, smaller, single-engined planes allotted only about 16 cubic feet per passenger.

Proper ventilation in an airplane is essential to personal comfort, yet until comparatively recent times, engineers have given the problem but casual consideration. In the first ventilation systems, fresh air was drawn in through sliding windows and adjustable cowl-type vents at each seat. Properly placed cowl vents are desirable for ventilation, but they should be regarded only as a supplementary aid to the main ventilating system. In newer designs all cabin windows are fixed. Ventilating systems, no matter upon what principle they function, whether electrical, mechanical or otherwise, must supply the correct volume of fresh air per passenger in such a manner that it does not create drafts of cold air at high intake velocities.

Department of Commerce regulations require that sufficient and proper ventilation be supplied for every passenger, but they do not outline any specific system, type or location of the equipment as to inlets or outlets. Since the air circulation in a closed airplane follows definite and well known paths, outlets must not be placed haphazardly. Intake and exhaust ports must be controlled by the pilot, guided by a master thermometer showing the temperature in the cabin.

Ventilation System Location

A longitudinal cross-section of a typical cabin plane is illustrated by the drawing in figure 1, which shows the usual course of air currents inside a cabin while in full flight. Intake and exhaust ventilators located in any other position will not function as efficiently as shown in this layout. In both single-engined and multi-engined planes it is best to have windows closed during flight, for no matter how carefully the engine exhaust out-

lets are placed, fumes and noise will find their way into the cabin. Therefore it is logical to have the cabin as airtight as structural and practical conditions will permit.

Cabin Temperatures

Today transport planes travel from low to high altitudes, from warm to cold climates, from calm to stormy regions, often within the course of a few hours. The many changes of temperature encountered in a flight of a few hours necessitate alert attention on the part of the pilot who must have the means to maintain proper temperature for the passengers' comfort. The cabin temperature should be conveniently controlled by the pilot, who should have electric distance-type recording thermometers on the instrument board, together with a wet and dry bulb thermometer, to indicate the relative humidity of the cabin air.

The ideal cabin temperature is 70°. At this temperature, there is sufficient temperature differential between the inside and outside air both for summer and winter. At a temperature of 70° (within the "zone of comfort") a rise or drop of 10° will not cause material discomfort to the passengers nor create an overload on the ventilating system.

Ventilating Requirements

In well designed aircraft, provision is made for the insulation of cabin walls from heat, cold and noise. Without such insulation it is difficult to maintain a constant temperature. From the standpoint of operating efficiency, the heating and ventilating systems should be separate,

but each controlled by thermostats, even though the separation of the systems requires more attention on the part of the pilot. Under normal conditions the natural change of the volume of air is very slow; hence, supplementary means must be employed to create sufficient circulation of fresh air.

An efficient ventilating system should accomplish the following, all with a minimum of weight or operating equipment: Uniform ventilation, temperature regulation, minimum drafts, preservation of incoming fresh air, preservation of humidity and freedom from impurities.

Humidity is another problem of the ventilation engineers. Without proper humidity, efficient ventilation cannot be achieved, despite the use of apparatus otherwise suitable for adequate air circulation. In figure 2 the "zone of comfort" graph shows how comfort is affected by humidity and that a condition of high temperature and low percentage of humidity, or *vice versa*, is important in assuring personal comfort.

Volume of Air per Passenger

The volume of fresh air required to be introduced artificially into the fuselage or cabin depends upon the temperature differential between the inner and outer air, moisture, organic matter, natural absorption, humidity, vitiation and leakage through joints, cracks, etc. Air volume also is influenced by temperature, relative humidity differential and resistance to the intake velocity.

In a restful position the average passenger requires a volume of 2,330 cubic

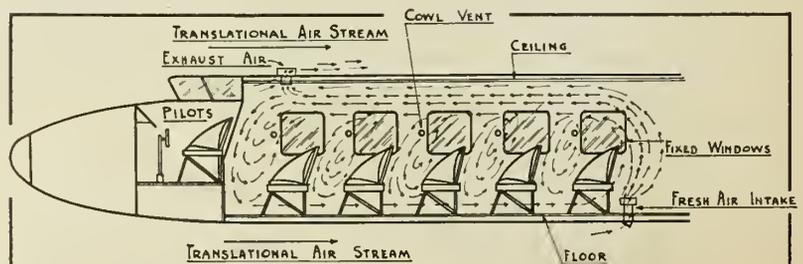


Figure 1. Usual course of air currents inside a typical airplane cabin

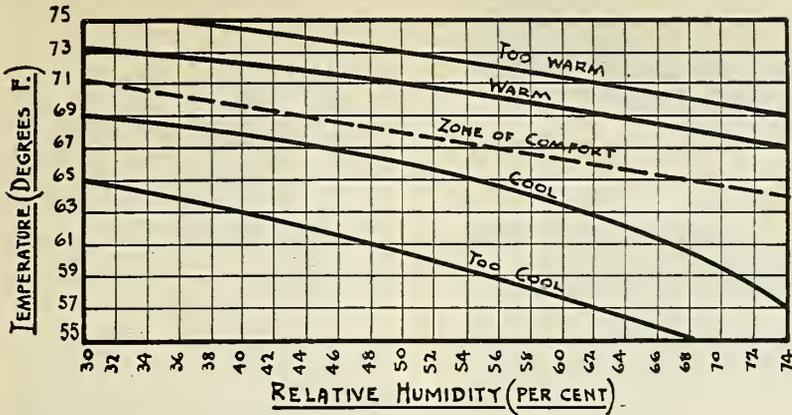


Figure 2. Graph showing relation of humidity and temperature

feet of fresh air per hour, at a temperature of 68° F., with an amount of .07% of CO₂ gas by net volume. If the percentage of CO₂ is raised to 10 parts in 10,000, an individual will require only 1,170 cubic feet of fresh air. As a ratio of CO₂ to fresh air, 10 parts in 10,000 is the highest amount desirable with proper ventilation taking place. The outside air contains .04% of CO₂ gas in its normal form, and the differential between the ratio of CO₂ internally and externally should not exceed six parts in 10,000.

Air required per individual can be determined approximately by the following equation:

$$Q = \frac{N \times .8}{P - .0004}$$

Where:

N = Number of passengers.

P = Permissible ratio of CO₂ gas to air volume.

Q = Individual cubic feet per person per hour required at 68° F.

.8 = Amount of carbonic acid gas per cubic foot produced in one hour at 68° F. by adult at rest.

.0004 = Amount of CO₂ in surrounding atmosphere.

Incoming Velocities

The velocity of incoming fresh air and exhaust air should balance so that the incoming air does not exceed two feet per second. This is necessary to avoid excessive drafts, but this velocity may run as high as 10 feet per second if it is found to have no effect on the passengers' comfort. No matter what the temperature, the cabin air should be changed as frequently as the temperature difference will allow. For normal circulation, incoming air should, as far as practicable, correspond to the temperature of the cabin, and for cooling purposes it must be at least 10° lower to absorb the latent heat of the air in the cabin.

On preliminary inspection the volume per passenger seems to be enormous, leading the airplane designer to adopt

high intake velocities. The large amount required may seem excessive until it is remembered that the volume of space allotted to each passenger is extremely small. Natural ventilation will complete its cycle in about one hour where there are openings and orifices, but in a crowded cabin, care must be taken to supplement this natural circulation; otherwise the cabin will become stuffy and humid.

Cabin Interior Circulation

The flow of air inside the cabin is illustrated in figure 1. This natural circulation is due to the translational velocity of the aircraft during flight. Circulation in this form is the result of minute leaks, giving rise to a difference in pressure between the air in the cabin and that in which the plane is flying. Since this is the natural flow, intake and exhaust ports should be situated as mentioned before. Small, rotatable, open cowl-type vents placed ahead of the seat of each individual help to cool the air and ward off stagnation. The control of the air circulation is a matter of the difference between the static and dynamic pressures as well as temperature difference. Simple shutter arrangements can control cabin requirements with regard to fresh air. However, it would be difficult to coun-

teract completely the natural circulation, except in a hermetically sealed cabin, which is undesirable in normal cabin plane construction of the present day. Small planes are no exception to the general theory of air circulation, although the problem involved is relatively simpler.

Intake and Exhaust Registers

Each inlet and exhaust register should be provided with screening, as indicated in figure 3. Dust, bacteria, natural effluvia, spores, etc., exist in the atmosphere at various altitudes and in various localities. Their exclusion is necessary from the standpoints of comfort and health. Also, in spite of precautions to exclude gas fumes from the engine exhaust (often due to eddies in the air flow), these impurities are frequently drawn in by intake registers and air scoops. Therefore, registers should contain removable cleaning and filtering screens.

System of Ventilation

Ventilation should be accomplished by mechanical means. The plenum method, whereby the air in the cabin is kept at an increased pressure above normal to avoid drafts, is not desirable. The mechanical system should use electrically-driven or air-driven ventilation blowers. The advantages of both are approximately similar. One method derives its power from the electric generating system, which, of course, means an increment in weight. The other depends on impelled rotors in the translational slipstream, and its use increases the drag. The electrically-driven rotor-type fan is probably the most positive in its action. No matter what method is adopted, consideration must be given to the fact that its use will result in the consumption of a definite quantity of gasoline, due to the increased drag, increased weight, or both.

Depending upon climatic conditions and altitude, from .6 pound to .8 pound of carbonic acid gas per individual is produced, which means that .09 pound of vapor per person per hour must be absorbed, discharged or dissipated by the introduction of fresh air through the ventilating system.

While air sickness is not common, the fact that the malady can usually be prevented by a good supply of fresh air makes it highly desirable for engineers to consider ventilation as an integral part of their design problems. Considerable thought will be given to high-altitude transport flying in the near future, and the ventilation problem consequently must be given more careful study. As a greater demand for transport airplanes is created, more efficient methods and lighter equipment must be devised. The comfortable passenger is a satisfied one, and fresh air does much to make a long air journey pleasant for the passenger. It will contribute in large measure toward bringing the "first rider" back for more.

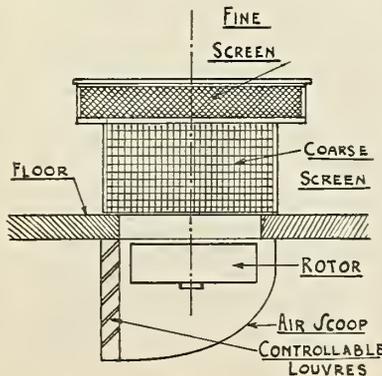


Fig. 3. Filter screen for registers



The Curtiss Hawk Fighter

● The heritage of the Curtiss Hawk fighter airplane is a long and illustrious one. While the first experimental Hawk pursuit plane was built in 1923, and production quantities not manufactured until 1924, many of the outstanding features of the Hawk type were direct results of the experience of the Curtiss company in building racing airplanes (both land and seaplanes) which established many world's records with each new development. New Curtiss racers were built each year from 1921 to 1926 inclusive, and the power requirements for these ships resulted in rapid progress in the development of more powerful engines. It was these powerplants which were used in all the early Hawk airplanes.

The first quantity production of these high performance fighters for the U. S. Army Air Corps was in 1924. These planes, powered with the Curtiss 435 h.p. D-12 water-cooled engine, had a high speed of 161 m.p.h., a climb of 1925 feet per minute, and a ceiling of 23,400 feet. It was one of these Hawks which made the first coast-to-coast flight between dawn and dusk. Each year new experimental pursuit planes of this type were brought out, each succeeding one incorporating the lessons learned in service. They were adapted for float gear, and quantities sold to the U. S. Naval Air Service. They were also adapted for use on the aircraft carriers. Various types of engines were fitted—air-cooled, chemically-cooled, and water-cooled. With each new model performances improved.

In 1926 the first planes of this model were sold for export, going to Chile, and

each year since then sales were made in this new field for American airplane products.

The latest type Hawks have a performance exceeding anything believed possible a few years ago. During the past year more than 100 Hawks have been sold in the export market, and this model is found in modernized foreign air services in many parts of the world.

Details of Construction

The fuselage is of chrome molybdenum steel tubular structure, built in three welded assemblies riveted together. The middle and tail post sections have adjustable tie rods for bracing between stations. Attaching brackets and fittings are welded into the fuselage structure for engine mount, wings, landing gear, tail wheel and tail surfaces.

The landing gear has a single pair of struts constructed of heat-treated chrome molybdenum steel. Landing loads are absorbed by a hydraulic oleo unit under the center line of the fuselage. Each half gear is a forged unit with the axle for the wheel and brake mechanism fitted into a socket at the lower end. The upper end of the strut is a part of a triangular structure which provides hinge points for the fuselage attachment, as well as the arm which carries the landing loads to the central oleo unit.

The wheels, manufactured by the Automotive Fan & Bearing Co., are mounted on tapered roller bearings and are equipped with brakes of the single shoe type, operated either individually or to-

DEVELOPMENT
•
CONSTRUCTION
•
PERFORMANCE



gether from the foot pedals. Goodrich tires are used, and the wheel track is 7 feet 8 inches.

The landing gear has a factor of safety of seven for a three-point landing, and will stand a free fall from a height of 61 cm. under the full normal load condition of the airplane.

The tail skid is steerable, being interconnected with the rudder to the pedals.

Stops and spring connections prevent the effect of side loading and shocks of rough fields being carried to the pedals. The shock absorbing device is a rubber disc pile mounted on a strut.

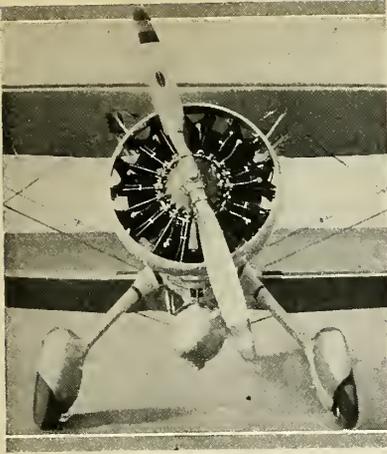
A tail wheel of oleo design (not interchangeable with the tail skid) can be supplied.

The upper wing is one continuous panel, tapered in plan and section. Beams are of hollow box section, with spruce upper and lower flanges and Haskelite plywood webs. Each beam is internally braced and reinforced.

Wing Fittings and Ribs

Welded steel fittings for attachment of struts, wires, etc., are formed about the beam and bolted through it. Ribs are built up wood trusses using spruce flanges, diagonal bracing and plywood webs. Diagonal drag trussing consists of steel tie-rods between beams.

The lower panels are constructed like the upper, with the exception that the rear beam is constructed with flanges of ash instead of spruce. The lower panels are attached to the fuselage, at the in-



adjustable, providing three positions by means of a latch, which permits the pilot to set the pedal position as desired.

A parking brake with control handle under the instrument board is provided. A light pressure against the handle engages ratchet dogs in the cable assembly, and the brakes are locked in position by depressing the handle while the foot pressure is taken off the pedal pad. They are released by depressing the pedal until the ratchet is overrun.

The control stick is a self-contained unit, full ball bearing and bolted to the floor of the cockpit.

The aileron control is a push-and-pull rod system in the lower panel, operating a strut to the aileron in the upper panel through a bell crank. Ball bearing joints and guides are used wherever possible.

The elevator control is a connecting rod from the stick to a ball bearing mounted lever behind the seat. From this lever double operating cables run to the horns.

Stabilizer Adjustment

The stabilizer control in the cockpit is a crank handle with an indicating dial showing the position of the stabilizer nose in degrees above or below level. An endless chain and cable assembly provide the connection between the operating crank and the elevating screws, attached to the elevator.

Control surface movements are as follows: Ailerons, 30° up and 17° down; rudder, 30° right and 30° left; elevators, 35° up and 20° down; stabilizer, total 7°.

Fuel is circulated to the carburetor by means of an engine-driven pump. A manual pump, for starting and emergencies, is installed with operating handle convenient to the pilot. A fuel pressure gauge on the instrument board shows the pressure of the gasoline supplied to the carburetor.

A fuel valve, which permits fuel to be taken or shut off from either tank, is furnished with control handle in the cockpit. A Lunkenheimer primer pump is mounted adjacent to the starter crank.

Fuel lines are of red copper tubing with brass screw couplings, silver-soldered to the lines. Where differences in vibration occur, flexible connections of rubber hose and clamps are provided.

Fuel Tank Combinations

The main fuel tank has a glass level gauge in the cockpit which indicates the amount of fuel in the tank. A shut-off valve is located to the left of the pilot's seat.

Two alternative types of fuel tank installations are available. Type 1 consists of the main fuel supply contained in a 50-gallon tank mounted in the fuselage ahead of the pilot. Type 2 comprises the same main tank, and also a 44-gallon tank mounted in the rear bay of the engine mount; these tanks are connected by a large line at the bottom, so that they operate as a single tank of 94 gallons. The tanks are of aluminum sheet with internal baffles riveted and welded to the shell. They are securely mounted on cradles and held in place with adjustable tie-down straps.

An auxiliary fuel tank, streamlined and installed underneath the fuselage, has a capacity of 50 gallons. In an emergency the pilot can drop this tank by operating a release handle in the cockpit.

The oil system is of the dry sump type. Two pumps are provided on the engine; one draws oil from the supply tank and circulates it through the engine; the other draws oil from the case of the engine and returns it to the supply tank, after pumping it through the oil cooler to lower the temperature. Oil lines are of aluminum

board end of both front and rear beams, by steel hinge pins.

From the front beam around the nose ribs, the leading edges of both wings are covered with a dural sheet fairing. Double flying or load wires are provided from front and rear beams of the upper wing at the center strut point to attaching parts on the lower fuselage longeron.

Dural sheet ailerons are mounted in the upper panel. The beam and ribs are of U section riveted together. Four ball bearing hinges attach the aileron to the wing. Each aileron has a trimming tab.

Wing panels and ailerons are covered with Dartmouth-Tex Grade A cotton cloth, sewed around the ribs with 1-inch spacing. All material and construction follows U. S. Army specifications.

The Empennage Group

Front and rear beams of the fin are of steel tubing, to which dural sheet ribs are riveted. The fin setting may be adjusted to compensate for engine torque and rigging variations.

The beam or torque member of the rudder is of steel tubing with dural ribs riveted to it. The operating horn is of welded steel shell design. An overhung balance reduces operating loads, and a trimming tab provides for directional adjustment.

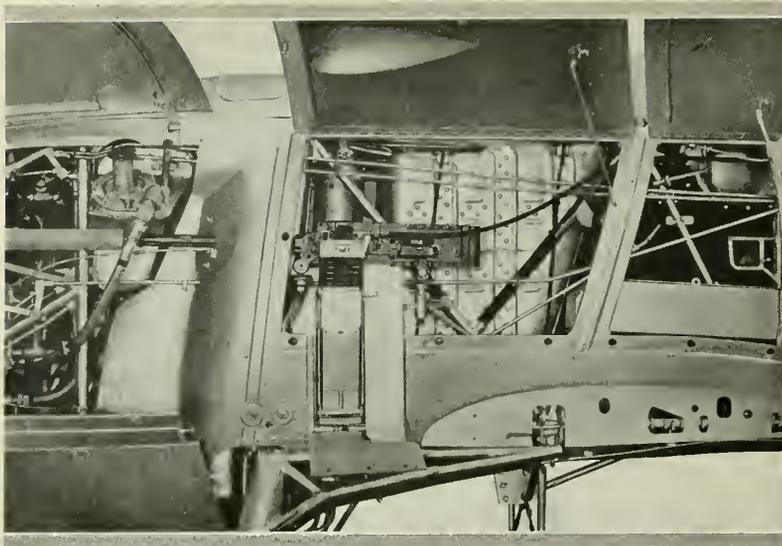
The stabilizer is adjustable in flight, the front beam being attached to two screw posts controlled through a chain and sprocket by a crank in the cockpit. The front beam is of steel tubing; the rear beam of dural sheet in U sections, like the ribs.

Front beams or torque members of the elevators are of steel tubing with trussed dural sheet tube riveted to them. Operating horns are welded sheet steel shells.

Rudder pedals are of the hanging type, of welded steel tubing. Large cast aluminum alloy brake-operating pads are attached to the lower pedal bar. Pedals are



Air view of the Curtiss factory at Buffalo, home of the Hawk Fighter



Side view of the Hawk showing machine gun installation, etc.

tubing, and a vent connection, between the engine crankcase and supply tank, is provided so as to maintain equalized pressures.

The oil tank is of the same general construction as the fuel tanks.

The cockpit has a full floor of aluminum alloy. The opening is shaped so that it is easy to enter or leave. Hand holds are provided in the rear of the upper wing just ahead of the cockpit.

The windshield is mounted directly to a welded steel superstructure. It is made in three pieces of non-shatterable glass, and designed to give the pilot protection from the wind. The glass is set in a molded rubber channel.

The sides of the cockpit cowl, as well as the windshield frame, have sponge rubber padding covered with leather.

All controls are within easy reach of the pilot while in flying position, to permit him to fly comfortably without causing him undue fatigue.

Instrument Panel

The instruments are grouped in a board directly in front of the pilot, under the windshield, so they are all easily visible.

The following instruments are provided: Kollsman air speed indicator, altimeter, supercharged pressure gauge and oil temperature gauge; Elgin tachometer and clock; Pioneer oil and fuel pressure gauges, and magnetic compass; Lewis thermocouple gauge.

The instrument board is indirectly lighted for night flying. A rheostat is provided so that the intensity of the light can be reduced to eliminate all glares or reflections. The face of the board surrounding the instruments is equipped with a sponge rubber pad, covered with leather,

to protect the pilot from face and head injuries in case of accident.

The pilot's seat is of aluminum alloy shaped for the use of the standard seat-type parachute. The seat height is adjustable in the air by means of a lever on the right side. Double locking devices secure it to the frame. The cushion back can be used as a life preserver in case of a forced landing in water.

There are two fixed machine guns, automatically controlled by two engine-driven synchronizers, firing through the propeller disc. The pilot's firing levers are attached to the control stick just below the hand grip.

Machine Guns and Ammunition

The guns are mounted on either side of the fuselage. Ammunition is carried in sliding removable drawers which may be loaded away from the ship. Additional ammunition drawers may be kept filled so that recharging of a plane is quickly accomplished.

The Hawk can be equipped with two 7.5 mm. or similar calibre Colt machine guns or one 7.5 mm. and one 12.5 mm. Colt machine guns. The capacity of the 7.5 mm. gun is 600 cartridges and of the 12.5 mm. gun 200 cartridges, giving the ship equipped with two 7.5 mm. guns a capacity of 1,200 cartridges, or an alternate of one 7.5 mm. gun with 600 cartridges and one 12.5 mm. gun with 200 cartridges, with a total capacity of 800.

The synchronizer gun trigger is of the E-4 type. A removable charging handle is furnished with a handle in the cockpit for each gun, convenient to the pilot. These controls are U. S. Army standard as are the sight and mounting provided just ahead of the windshield.

Automatic ammunition counters are provided with dials in the cockpit indicating the number of cartridges available for use at all times for each gun.

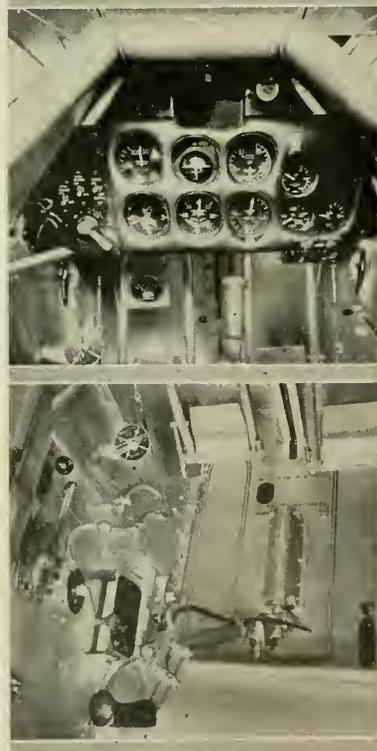
The metallic cartridge links used to form the machine gun ammunition belts are designed so that (except for the 12.5 calibre) they can be retrieved and used again. This is accomplished by providing a container or by closing the exit to the ejection chute with a door. The container or chute will accommodate one complete loading of the links.

Provision is made to mount a U. S. Army type A-3 bomb rack under each lower wing. Provision may be made to carry a fuselage bomb rack in place of an auxiliary fuel tank.

The necessary charging and releasing controls are located in the cockpit within easy reach of the pilot. Supports and brackets for bomb rack installation are provided. Supports and controls are also provided to carry two parachute flares. A holster is installed for a Very signal pistol and rack for six cartridges.

Space is available on the left side of the cockpit for installation of a radio receiving remote control box; also in the fuselage bay, behind the pilot's seat, for radio set mounting.

Electrical equipment consists of the following: Provision for mounting an electrical generator on the engine. Exide



Instrument panel and cockpit

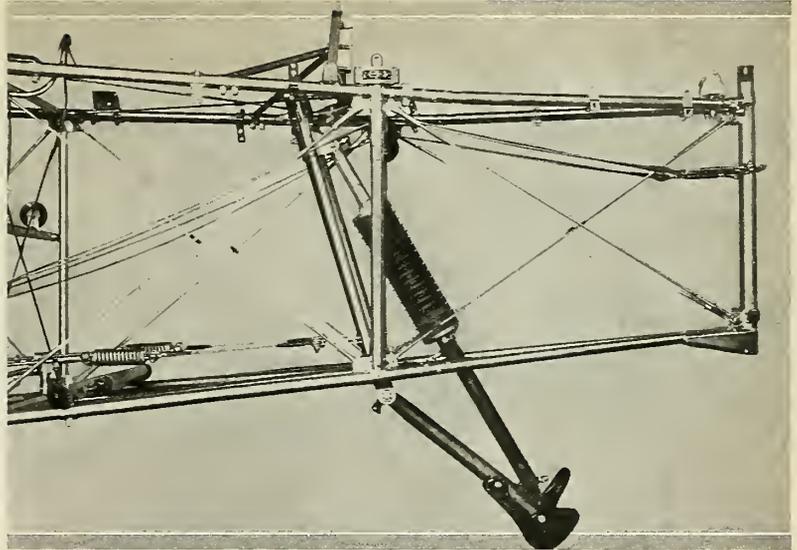
battery. Instrument board indirectly lighted by four lights. Navigation lights on each wing tip and at the top of fuselage. Cockpit illumination light. Main fuel gauge light. Wiring and switches for installation of landing lights on the lower wing. Switches for instrument board lights, navigation lights and fuel gauge light. Wiring covered in tubular conduit bonded and shielded against radio interference. Connecting plug for heated flying suit. Booster magneto with remote control. Ignition switch.

The engine compartment cowling consists of rigidly attached formers and large doors which are easily removed for servicing. The cowling is of reinforced and stiffened aluminum alloy sheet.

The fuselage from engine compartment to pilot's cockpit is also cowed with large, easily removable doors, permitting quick access to all installations for servicing.

The fuselage is covered with Dartmouth-Tex Grade A cotton cloth, except above the upper longerons where a hinged turtle back provides a baggage compartment equipped with a combination lock.

The propeller is a Hamilton-Standard all-metal type with aluminum alloy blades; it is adjusted by the manufacturer to the proper angle of attack.



Rear of the fuselage, showing tail skid structure and arrangement

General equipment consists of the following items: Eclipse Hand Inertia starter. Pressure type fire extinguisher in the engine compartment with control in the cockpit. Flexible fabric map case at right of pilot's seat. Holder for airplane flight report at left of pilot's seat. Oxygen bottle, supports and mounting, with control valve support in the cockpit. Pocket under the seat for manual of maintenance and service. Tool kit and cockpit cover.

Power Plant

Any one of the nine models of Wright Cyclone R-1820-F nine-cylinder, air-cooled engines of 1823 cubic inches displacement may be provided with the Curtiss Hawk. As the Hawk is designed for high altitude flying the Cyclone R-1820-F2 and R-1820-F3 power the majority of these ships now in service.

A detailed description of these engines, together with photographic details of some of their component parts and sub-assemblies, appeared in the October 1932, issue of AERO DIGEST.

The R-1820-F2 is approved by the U. S. Department of Commerce for a rating of 735 h.p. at 4,000 feet; it has a supercharger drive ratio of 7 to 1 and a compression ratio of 6.4 to 1. Fuel required is of 87 octane number. The R-1820-F3 is rated at 710 h.p. at 7,000 feet; it has a compression ratio of 6.4 to 1 and a supercharger drive gear ratio of 8.3 to 1 for use with fuel of 87 octane number. Both of these engines are equipped with special Stromberg carburetors of the four-barrel (venturi choke) type to provide the greater air intake volume necessary at high altitudes.

The only difference between these engines is in the ratio of their supercharger

drive gears. Hence an operator of a Hawk powered with a Cyclone rated at 735 h.p. at 4,000 feet may convert his engine into a Wright Cyclone R-1820-F3 rated at 710 h.p. at 7,000 feet by substituting supercharger drive gears of 8.3 to 1 ratio for the 7 to 1 ratio gears.

In countries where 87 octane fuel is not available, several models of the Cyclone for use with 73 or 80 octane fuel may be supplied. These engines are identical with the R-1820-F2 and R-1820-F3 except for the ratio of their supercharger drive gears and may be converted for operation at higher output by the use of higher supercharger drive gear ratios and fuels of higher octane numbers.

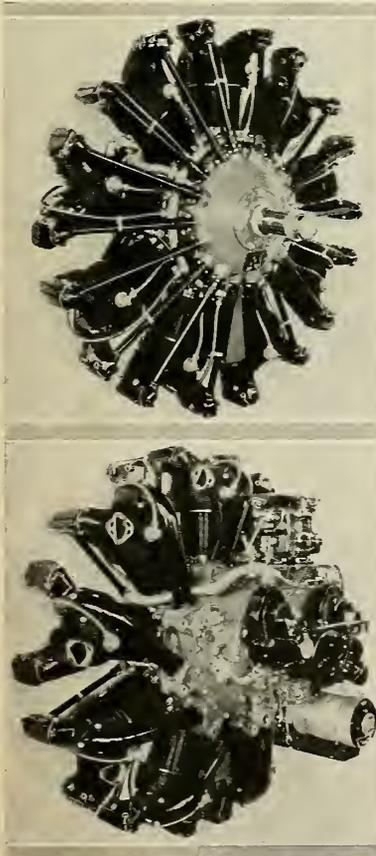
The Curtiss Cyclone Hawk has a high speed in excess of 200 m.p.h., and a landing speed of less than 60 m.p.h.

Specifications

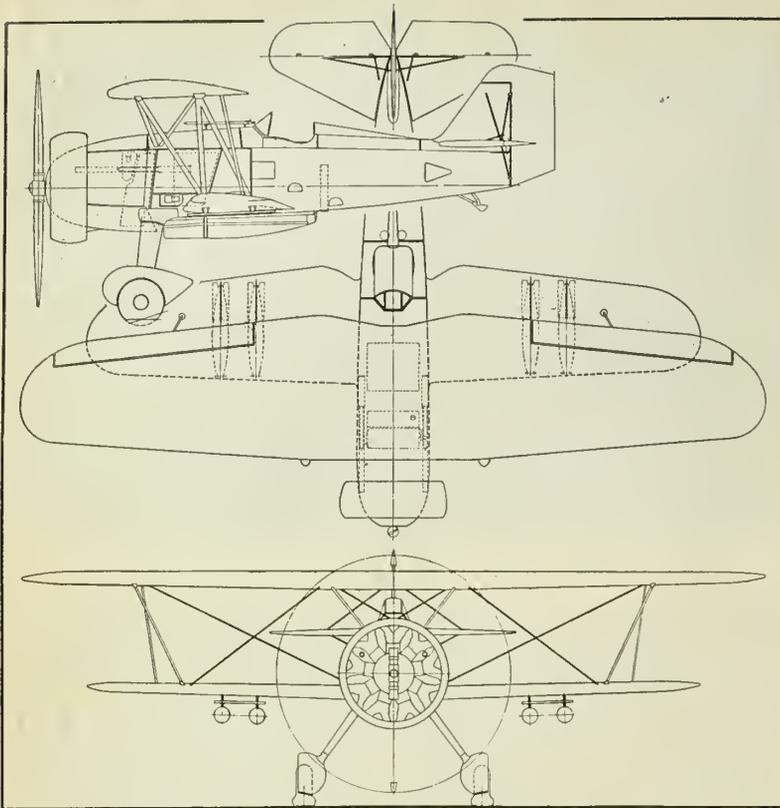
Wing span	31 feet 6 inches
Length overall	22 feet 4 inches
Height overall	9 feet 9 inches
Wing area	252 square feet
Wing loading	13.53 pounds per sq. ft.
Weight empty	2723 pounds
Pilot and parachute weight....	200 pounds
Gasoline weight (50 gallons)...	300 pounds
Oil weight	30 pounds
Equipment weight	28 pounds
Armament weight	128 pounds
Total useful load	686 pounds
Total weight	3409 pounds

Packing for Shipment

Packing the airplane for export has been well standardized in principle. Before packing the different assemblies in boxes, a certain amount of preparatory work is necessary. First each airplane is completely erected. After erection inspection, the wings and tail are removed to the shipping department. The fuselage is run into the engine test shed for



Views of the Wright Cyclone engine



Three-view outline scale drawing of the Curtiss Hawk fighter

a power plant installation test of sufficient duration to prove its satisfactory operation. This test is run with Ethyl fuel and since, in case of long storage, Ethyl deposits may cause corrosion, stick valves, etc., the tanks are drained after this test and the engine run for thirty minutes at 1000 r.p.m. on regular fuel. After the engine has cooled (but before it has actually chilled) spark plugs, cam housing, etc., are removed and the engine sprayed inside and out with a rust preventing lubricant.

The ship is next moved to the finishing room where it is completely cleaned. After inspection it is returned to the final

assembly department for the last finishing operations.

The airplane is packed in two boxes, one containing the fuselage with engine installed, landing gear and propeller, and the second, the wing and tail assembly. Keeping the entire power plant intact makes for quick erection at its destination.

In packing airplane assemblies the first consideration is the tie-down. The center of gravity in the fuselage box is held as low as possible and a certain amount of fore-and-aft balance is maintained. The fuselage derives its main shipping support from the landing gear

lugs. The supports are heavy steel cradles designed to withstand shipping loads and especially to take shocks encountered in railroad switching. The only other tie-down is at the tail post. The all-metal tie-downs are of simple design and are carefully anchored to the bottom of the box. In order to distribute the loads, the steel fittings are set on heavy timbers of considerable area, fastened to the bottom with bolts.

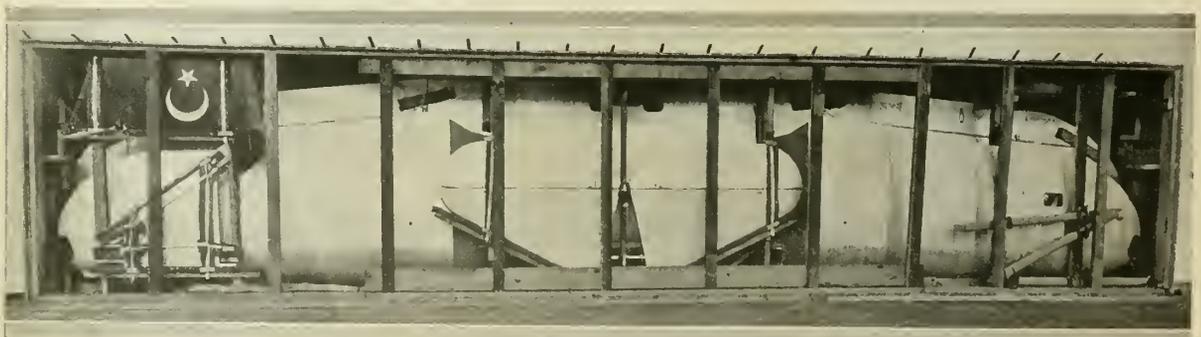
Wings and tail are supported on the leading edge over a sufficient distance to distribute the loads. They are held upright by wood supports cut out to fit the curves and lined with felt. The end supports over the wing tips are lined with three layers of felt, forming a thick cushion. The end of the box may deflect somewhat in handling and the extra thick cushion will take this without extending the load thru the wing structure.

Final Packing Operations

The top, bottom, sides and ends are nailed up separately. These units are joined with lag bolts for extra rigidity and to facilitate taking down at the time of unpacking. As a longitudinal reinforcement, four timbers about 15 feet long are built in each box. These 2- x 8-inch timbers run through the center portion and are secured in the corners where the top and bottom meet the sides.

Packing sheets listing all parts are checked in and during the packing operation there is a constant inspection follow-up. The insides of the boxes are lined with heavy waterproof paper and after final inspection another covering of waterproof paper is tied around the units. The boxes are then closed from the side and after nailing band-iron straps over the edges, the packing job is completed by nailing over the top tar paper covering with sealed points.

Regardless of distance, means of transportation, climatic conditions, etc., the packing methods and specifications are similar; that is, preparation is made for the shipment to withstand the worst conditions likely to be encountered.



Wings and tail group of the Curtiss Hawk being packed for export shipment to Turkey



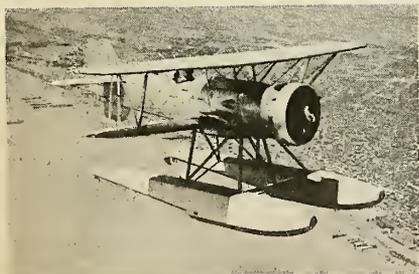
Curtiss

**CYCLONE
HAWKS**

Sold to **FOREIGN GOVERNMENTS**
..... in Twelve Months



Curtiss Cyclone Hawk



Curtiss Cyclone Hawk Seaplane

THE Curtiss Cyclone Hawk has been selected to head the fighting squadrons of many foreign governments. During the past twelve months, 102 planes of this type have been manufactured and delivered abroad by the Curtiss Aeroplane & Motor Company, Buffalo, New York.

The Curtiss Cyclone Hawk is the latest development of a famous pursuit type of military aircraft. The first Hawks were built for the U. S. Army in 1923. Since that date, hundreds of planes of this type have been manufactured continuously for the crack fighting squadrons of the United States Army, Navy and Marine Corps.

The U. S. Navy purchased 28 Curtiss Cyclone Hawks during 1933. These fighting planes have been assigned to the famous "High Hat" Squadron stationed at the Naval Operations Base, San Diego, California.

*Export Representative: Curtiss-Wright Export Corporation
30 Rockefeller Plaza, New York City, U. S. A. Cable: Aeroexco*

CURTISS AEROPLANE & MOTOR COMPANY, INC

BUFFALO

A Division of Curtiss-Wright Corporation

NEW YORK

AUTOFAN

WHEELS and BRAKES

..... Standard on
the CURTISS "HAWK"

"Used on a fighting plane."
There can be no disagreement that these words express the ultimate in recommendation—particularly when the equipment in question is used on a plane like the Curtiss "Hawk." For this plane has not only satisfied the U. S. Army and U. S. Navy authorities, but those of several foreign countries as well.

The quality, workmanship and stamina of the Autofan Wheels and Brakes used on the Curtiss "Hawk" are typical of Autofan Aeronautic Equipment. Behind the Autofan Line are many



years of experience. And more. There is the realization on the part of every Autofan employee that the aviation field is different. In no other does a slight miscalculation in strength or in weight prove to be so serious.

Autofan landing wheels and brakes, and tail wheels, are built to Air Corps standards, as well as the new Autofan streamline wheels and tail wheels. Our engineers are ready at all times to cooperate with airplane manufacturers in the design and selection of the proper wheels and brakes for any type of plane.



Automotive Fan & Bearing Co.
Jackson

Michigan

(A-8842)



These Curtiss "Hawks" were built for PUNISHMENT (THE GIVE AND TAKE KIND!)

THEY'RE tough—throughout. They have to be, for in time of emergency only the fittest survive. Even in daily practice these "Hawks" receive hard handling. ¶ Their fabric must stand the gaff of violent maneuvering—fast, rough landings—exposure to sun, rain, snow, ice and sleet. It does. Because it's **DARTMOUTH-TEX**. ¶ One can appreciate better the strain to which the "Hawk's" fabric is subjected when it is told that, during

terminal velocity dives, the "Hawk" has attained speeds as great as 360 miles per hour. ¶ Curtiss chose **DARTMOUTH-TEX** for the "Hawk" because their years of experience with it proved that you cannot buy a better fabric. With military specifications as a standard, prominent commercial manufacturers are using **DARTMOUTH-TEX** for their planes, too; thus assuring long life and low upkeep cost to their purchasers.

Military and commercial aircraft manufacturers, dealers—write for samples and prices.

W. HARRIS THURSTON
THURSTON CUTTING CORP.
40 Worth Street, New York, N. Y.

The Curtiss "Condor" which Admiral Byrd is taking to the South Pole is covered with **DARTMOUTH-TEX**—just as planes used on his two previous expeditions were. **DARTMOUTH-TEX** stands up under extreme climatic conditions.

NEW EQUIPMENT and METHODS

Radio Beacon Course Indicated Visually

• RADIO "COURSE INDICATORS," located on the dashboards of airplanes where the pilot may watch them, have been developed and demonstrated by engineers of the Westinghouse Electric & Manufacturing Co.

The system removes the necessity for the pilot to listen to beacon tone signals and places an indicator in the form of a meter on the dashboard of the cockpit. This meter, which indicates the correct course, operates similarly to the battery ammeter in automobiles. The meter normally rests in the center, which is marked zero, but when the plane drifts to the right or left of the proper course, the meter also indicates deviations to the right or left.

The complete radio receiver for operating the course indicator is contained in a box about 18 inches long. Although the equipment consists of but a single tuned radio frequency receiver, it has unusual sensitivity. The use of a specially developed vibrating reed filter permits the operator to listen to weather reports without interruptions to the course indication appearing on the dashboard meter. The signals picked from the beacon station by this receiver are a simultaneous mixture of weather reports and low-frequency course-indication signals. The apparatus associated with the receiver is so arranged that these two signals are separated, permitting the operator to see the one and hear the other.

In order that the pilot will have constant signals during his flight, a sensitive automatic volume control is arranged for operation in connection with the receiver. In addition to this, a second meter is used on the dashboard to indicate the volume output of the pilot's receiver at times, thereby giving him knowledge of the operation of the radio beacon transmitting station. The receiver also operates from the aural beacon signals.

The transmitting equipment used for demonstration is capable of producing about 500 watts of the visual course signal and about 1,250 watts of the voice modulation for weather information. The equipment can be adjusted for operation at any frequency within the range of 225 to 375 kilocycles.

With the visual method of course indication, the pilot is not required to listen to a monotonous tone during flight, but rather to observe occasionally the course on a meter on the dashboard, resembling the other instruments used for the operation of the plane. Another feature possible with this new system is that the pilot can adjust his equipment to give him any desired angle of flight with the main beam of the beacon system. With

the aural system it was necessary to fly exactly along the beacon course and then turn at the proper point to arrive at some destination not in the path of the beacon.

The receiving and transmitting equipment used for demonstration was designed and manufactured for the Airways Division of the Department of Commerce at Westinghouse radio headquarters in Chicopee Falls, Mass.

Soft Rubber Earpieces for Radio Telephones

• AS A FURTHER convenience to pilots of planes equipped with Western Electric radio-telephone systems, that company now produces flexible rubber earpieces for use with its midget receivers. These receivers, which are supported by the external ear and require no headband, have been available for some time, but due to the necessity of having plaster casts of users' ears to make up the former hard rubber fittings, not many have been used. Now the soft rubber earpieces are manufactured in several standard sizes.

A pair of receivers with connecting cords weigh less than three ounces, while standard headsets are fourteen ounces.

Electric Timer and Camera

• A PORTABLE high-speed camera and electric timer has been developed by Electrical Research Products of New York, N. Y. The camera operates at speeds ranging from eight to 2000 frames per second, or 125 times normal motion picture speed. It photographs the object in motion and the time, as recorded by the timer in minutes, seconds and hundredths of seconds, on the same strip of motion picture film.

The timing system is a further improvement of the Kirby race timer, used at the National Air Races last year, and is a joint development of Bell Telephone Laboratories, Electrical Research Products and the Eastman Kodak Co.

The time is recorded by a precision electric clock driven by a current generator which consists of an electrically actuated tuning fork. The vibrations of the fork are thermostatically controlled with a current cycle accuracy of one part in 25,000 under operating conditions ranging in outside temperature from -20 degrees to 120 degrees Fahrenheit. In temperatures from about 40 degrees to 90 degrees, the current has a cycle precision of better than one part in 100,000.

The clock, driven by the current, records time on three concentric revolving discs, giving the time in minutes, seconds and hundredths of a second, and per-

mits readings to be taken in thousandths of a second. The image of these discs is photographed by the camera as well as the object so that a permanent record of both time and action is simultaneously recorded on the same film.

The camera is of the continuous type, uses standard 16-mm. film and is electrically driven, affording continuous operation up to 200 feet of film. It may be used on any tripod and can be moved and tilted in any position while in operation. It is reported that no difficulty is experienced in providing enough light for good film exposure, even when the camera is operated at top speed.

The timing system is designed to provide for the study of high-speed motions and combines both high-speed photography and precision timing. It can be carried by one man and may be successfully operated any place.

It also is designed to provide a satisfactory means of analyzing the complete operation of fast-moving machinery, such as the valve spring and tappet mechanisms in gasoline engines. The flexure of an airplane propeller at full speed may be shown and studied. A permanent record is available, and a record of non-recurrent or transient phenomena is made possible.

FUR COMFORT AT LOW COST



These Garments are the best value I have ever seen for warmth and comfort. I recommend them.

Clarence Chamberlain

AVIATOR'S SUIT

No. 1—(Illustrated)

Just right for Duck Hunting, Fishing, etc. Tan Gabardine, 100% waterproof. Genuine glazed Manchurian fur lining throughout. Beautiful fur collar. Perfect comfort at any temperature.

SIZES 36 to 44

Guaranteed Cost to U. S. Government

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OUR PRICE **\$14⁹⁵**

NO. 1 A. AVIATOR'S SUIT

Same as above, with best rustproof "Hookless Talon" Zippers. **\$18⁹⁵**

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32 volts—1000 watts. Standard make. New and modern. A real buy—value \$400. Our price \$137.50—Send for complete details.

MONEY BACK GUARANTEE
If in 5 days you are not entirely satisfied with any garment, we will refund your money.

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Send for illustrated free catalogue: complete line of outdoor clothing, made-to-order clothing, sporting goods, gifts and hundreds of other bargains.

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HASKELITE

and

HAWKS



HASKELITE was used in the 102 Curtiss Hawks exported to foreign governments this year, and has been used in practically every plane built by the Curtiss organization since the World War.

Year in, and year out, since its inception sixteen years ago, HASKELITE has met Army and Navy specifications by an ample margin. It is the only aircraft plywood which can boast of such a record.

Curtiss chose HASKELITE because it meets the exacting requirements demanded of its ships in rigorous military and commercial service.



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MANUFACTURING CORPORATION
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AIRCRAFT

Braced with

HARTSHORN

TIE RODS

are faster and use less fuel



Hartshorn Streamline Tie Rods are light and extra strong; they offer little wind resistance. That increases speed and reduces fuel consumption. They don't stretch. That cuts "follow-up" and lining-up costs. They are regularly available now in highly polished non-corrosive, 18-8 grade stainless steel which far exceeds the 700 hour standard salt spray test.

Square Section Tie Rods can be adjusted with the wrench

applied anywhere along the rod. Tight corners are no longer troublesome. The flat faces permit making rods fast at inter-sections. A glance along the rods shows up even the slightest torsional strain.

Curtiss Hawks, as featured in this issue, are braced with Hartshorn Tie Rods. We are proud of their contribution to the speed, manoeuvrability and safety of these modern pursuit planes.

BRACE EVERY SHIP YOU BUILD OR FLY WITH

Hartshorn **AIRCRAFT**
TIE RODS
Est. 1860 **STEWART HARTSHORN CO.**
250 Fifth Avenue, New York, N. Y.



Personalities

● THE PATHETIC pictorial exhibit marked Bill Sievert was posed especially by that gentleman himself and not by Charlie Chaplin in a Teddy-bear suit; and the glum look on the handsome Mr. Sievert's face is intended as a composite picture of the group expression of seven old pilots contemplating their future. Incidentally, the blank wall behind Mr. Sievert symbolizes the immediate future of most of us, whether we realize it or not. Bill himself, you will note, is fully equipped to withstand the rigors of a cold, hard Chicago winter in the Roosevelt reconstruction era. Hearing that the big bad wolf is apt to be at the door, Mr. Sievert is dressed to outwit that rapacious animal by leaping nimbly outside and allowing the wolf to enter the house, where it may starve to death.

Captain Will C. Sievert, the flying bug now being placed under the biographical microscope, was born at Hoopston, Illinois, Sept. 16, 1897, and finished his education at the University of Illinois. At the early age of 16 he had displayed wild and unsettled tendencies: he had built a glider. Whether it glided or not is aside from the point; the fact that he even built a glider back in those days of 1913 is enough to convince a psychologist that young Sievert was possibly in for a hard life. Few boys who built gliders ever got anywhere financially.

Knowing of this dark glider lurking in the distant Sievert past, you will not be surprised to learn that 1917 found the misguided youth skulking about the Army's premises as a flying cadet. In this humble status he remained static until 1918 when he leaped to the lordly rank of Second Loot and took advanced courses to become an instructor, after which he was so valuable to the Forces that he couldn't be spared to go to France. Although he didn't think so at the time, this was the first bit of luck he had encountered in his 21 years, for he was to enter on a mad military whirl of gayety, change, and continual movement.

He became test pilot at Langley Field, Va., now the public-supported country estate of "Doctor" Lewis of the N. A. C. A. The moment Sievert tested his first Army plane the Army came to the conclusion that here was just the man for the Navy, so he was detached for flying boat instruction in the Navy at San Diego. Oddly enough, the Navy felt

by Caldwell

that it was a shame to deprive the Army of such a man, so they arranged to have him taken back into the Army as officer in charge of flying at Rockwell Field. A year later he was wandering around the Philippines as engineering and armament officer with the 2nd Aero Squadron. The moment the Filipinos got a look at Captain Sievert they began clamoring for independence—that's what really started them off. Personally, I'd be glad to see the Filipinos enjoy a brief period of independence between the time the United States lets them go and Japan grabs them—say, about three days.

But we were talking of Bill Sievert. In 1920 he decided to take a whirl at civilian life—not foreseeing the depression that was coming nine years later—and he started the Edgewater Beach Flying Service of Chicago. In 1923 he gave up the hopeless struggle to make an aeronautical living in those days before Dave

Behncke had made the aviation world financially safe for airline pilots. Back to the Army and three meals a day, instead of one doughnut and a hot dog, went Captain Sievert on active duty at Chanute Field and Selfridge Field for the next three years until 1926, when the Sievert Aircraft Corporation became the first operator on the Chicago Municipal Airport, and Bill became City Airport Manager and distributor of Fokkers and Eaglerocks. This activity prevailed through 1927, but in 1928 word was flashed over the wires: "Army Air Corps efficiency on the wane—Bill Sievert back."

For three months he graced the Army, adding greatly to its charm and incidentally taking a radio and a photographic course. Then he became senior pilot of Universal Airlines, an outfit whose social tone I also helped to raise by flying for it in 1929, being one of the few pilots to quit without a row with Bill Bliss, who always treated me with the greatest kindness and courtesy—two traits for which William became gradually less and less famous, until the regrettable Century strike which left him practically bereft of cheers from the boys.

Bill Sievert flew between Chicago and Cleveland for Universal until October of 1928, when he leaped back into the Army for active duty at Selfridge Field. The tax-payers couldn't get rid of him until 1929 when he became an aeronautical consultant with Aviation Industries, Chicago—there was practically nothing aeronautical he couldn't be consulted about by that time. They talked to him for three months and apparently got out of him all the information he had in him, for soon he was flying for Fox Movietone News, New York City, and a month later for Fokker Aircraft Corporation. In 1930 he was back in the Army again, Air Corps Reserve, and from April, 1930, he rotated between flying for Alfred Kohlberg, Inc., New York and the Army. In 1931 he joined Central Air Terminal Co. at Chicago, a Phil Kemp enterprise. On Bill's last tour of duty with the Army he fell foul of one of the outrages of 1921-22 (a line officer transferring into the Air Service with his old rank). The result is that he has ceased jumping back into the Army and may be found in Chicago, where I would have found him if I hadn't been detained by more pressing matters in the Ladder Club.



Capt. Will C. Sievert

• IN OCTOBER, 1897, Willard F. Bridgeman was born in Ottumwa, Iowa, that grand old state where the tall corn grows. After the public schools he went to Northwestern Military and Naval Academy, where he learned enough about long marches not to join the infantry in the war, although military students were offered infantry commissions upon graduation. Instead, he went to March Field at Riverside, Cal., in October, 1918, and was trying to get into the Air Service when the war stopped. It served him right for not accepting the opportunity to walk through the war with a pack on his back. After all, someone has to join the infantry; we can't all do our fighting sitting down, though I may say that I refuse to fight in any other position.



W. F. Bridgeman

He returned to Iowa still wanting to fly, so in the spring of 1919 when a Lieut. Johnson barnstormed into Ottumwa in a Canuck the disappointed warrior climbed aboard, took a few hours' instruction there and in Kansas City, and then bought a Jenny in the original crate from Clarence M. Young, who at the time was distributing Jennys for the Herring Motor Co. of Des Moines. Since then Bridgeman has owned two Canucks, an OX and a Hisso Standard, one Waco nine, and three American Eagles. He barnstormed Iowa, Missouri, Kansas and Nebraska from 1919 to 1927, and did passenger hopping and instructional work during his operation of the Ottumwa, Iowa, Airport in 1928 and 1929. It is due largely to the pioneering work of Bridgeman, and to the aviation interest of John Morrell and Co. that Ottumwa has a fine airport.

I am reminded of Jonah and the whale in connection with Willard Bridgeman. It seems that when Clarence Young sold him that Jenny from the Herring Co. he charged him \$5,000 for it. Writing symbolically, as the old Hebrew historians delighted to do, I might say that here is a clear case where an American pilot and his bank-roll were swallowed by a Herring. A Young Herring, at that!

• **ASTROLOGY STUDENTS** agree that when Pilot Garza A. Wooton was born in Collinsville, Texas, Oct. 16, 1896, the planet Venus was in the ascendant and exerted a pull on him for over 36 years, finally exercising a force sufficient to hurl him into the romantic business of flying to the aid of beauty in distress. So far as I know, he is the only pilot so

engaged, and therefore is a curio in his own quaint way. Not to make a mystery of the matter, he flies for E. Frederics, Inc., rushing their promotion manager, Paul Rilling, from place to place with hair dryers, hair wavers, and other supplies demanded by beauty in distress—and a beauty with damp or straight hair certainly is in distress. The moment a beauty or even an ordinary married woman gets her hair wet, or loses her curl, she telegraphs Mr. Rilling, "Come at once with your hair dryer and permanent waving machine—I need immediate restoration." That's how I imagine it is, anyhow; though it's a business I know little about. Incidentally, both these hair specialists are growing bald, themselves.

This rapid delivery of first aid to the frowsy female started in January, 1933, when Paul Rilling decided that the exigencies of the situation demanded that he get around the country faster, because scattered about the 48 states were thousands of women who couldn't bear to look into a mirror until adequate renovation had been made. So Mr. Rilling procured a Stinson R and the aforementioned Venus-controlled Wooton, and flew to his sales demonstration work in all the principal cities of the United States, and even such overgrown small towns as Philadelphia, which never will be a city, no matter how big it grows. They flew from Seattle to Los Angeles, making all stops, to the middle west and the south, as far north as Bangor, Maine, and south to Florida. They covered the whole country, carrying the gospel of permanent waves to impermanent wives, and even imparting a modicum of hope to old maids who had given up hoping shortly after the Spanish-American War, for in those days curl papers were women's sole aid. What Cupid owes to Mons. Marcel can never be calculated.

In six months Wooton and Rilling covered a continent, and changed the outlook of 36,789 women and two crooners, a task that would have taken a year and a half by automobile or train. This is what is known as progress, and is also good advertising for any business. Just a note here to the sales managers in other industries, most of whom seem to think alike and talk alike. Why not be different, at least in the matter of transportation? It will gain you attention to arrive in an airplane, not so much as it would have a few years ago, but still enough to set you apart from the crowd who wheeze into town in rattling coupes. You might even *sell* something, though we needn't be too optimistic about that.

Garza Wooton, the flying beautician, became unsettled in 1910 when a flying meet at Dallas fairgrounds introduced Texans to a business quite as uncertain as drilling for oil. In 1912 he became still more unsettled by helping Harry Peyton build what seemed to be more or

less an airplane; and in 1917 he was entirely unfitted for a quiet life by enlisting at Love Field, where he became a trouble shooter for Tex Lagrone, Knox Martin, Turk Gardner and other civilian flying instructors. It was Turk who taught him to fly; and he soloed after the armistice, joining the Curtiss Southwest Company. In 1920 Wooton and Albert Newson started the Creek Airplane Co. at Okmulgee, Okla., which lasted until a wing came off the ship two members of the firm were flying to Tulsa. Albert Newson and Bob Metcalf were killed.

The second ship which Wooton then flew for an Indian from Mounds, Okla., lasted until New Year's day, 1921, when Wooton made what he refers to as a "mistake" with it, and then crawled out from under the pile of splinters and fabric and went with the Horchem Aerial Circus, which consisted of J. D. J. Horchem and himself as pilots and three parachute jumpers and wing walkers. In 1923 the circus was disbanded after the tragic death of Mrs. Horchem in a parachute drop at San Antonio. Wooton flew occasionally during the lean years until 1927 when he went to Dallas and flew with M. M. Merrill for the Curtiss Company, and in 1928 joined Southern Air Transport (now American Airways) and stayed with them until 1930. For the next two years he did photographic flying for Edgar Tobin of San Antonio, Texas, then went with E. Frederics, Inc., making life brighter and better for women who want their hair waved. Women are funny things: the white ones want curls put in their hair, and the colored ones want the kinks straightened out. If in addition to their hair waver, the company would invent a hair straightener and fly to Harlem or South Chicago, they'd double their business. I offer the suggestion in a spirit of helpfulness.



Specialists Rilling and Wooton

THE AIR SERVICES

Naval Aircraft Gunnery Champions

FOUR SQUADRONS were recently announced as winning gunnery trophies for aircraft gunnery standings for the gunnery year 1932-33 as follows:

Patrol Plane Squadron NINE-F, Fleet Air Detachment, San Diego, Calif., commanded by Comdr. A. D. Bernhard; highest merit in the VT-VP Class.

Fighting Plane Squadron ONE-B, Fleet Air Detachment, San Diego, Calif., commanded by Lieut.-Comdr. F. P. Sherman; highest merit in the VF-VB Class, Navy Squadrons.

Scouting Squadron ONE-B, commanded by Lieut.-Comdr. R. D. Lyon; highest merit in the Scouting Plane Squadron Class, exclusive of Cruiser-Based Squadrons.

Fighting Plane Squadron TEN-M, West Coast Expeditionary Force, San Diego, Calif., commanded by Capt. V. F. Guymon; highest merit in the VO-VF Class, Marine Corps.

Commanding officers of the aviation ship units with the highest aircraft gunnery scores in their classes have won letters of commendation from the Secretary of the Navy. These groups include:

The U. S. S. *West Virginia* aviation unit, commanded by Lieut. N. R. Hitchcock; highest merit in the Battleship Aviation Unit Class.

The U. S. S. *Salt Lake City* aviation unit, commanded by Lieut. J. G. Johnson; highest merit in the Heavy Cruiser Aviation Unit Class.

The U. S. S. *Milwaukee* aviation unit, commanded by Lieut. W. P. Davis; highest merit in the Light Cruiser Aviation Unit Class.

Alabama Unit Awaits State Aid

IN A DECISION handed down by the Attorney General's office of the state of Alabama, the state Air Service Commission is restrained from borrowing funds from the Federal Government to construct quarters at the Birmingham Municipal Airport pending a state appropriation.

The quarters were to house the 106th Observation Squadron, N. G., and it was intended to borrow on the forthcoming appropriation of \$150,000. Present quarters at Roberts Field are considered too small.

Plane Metals Withstand Extreme Cold

SUB-ZERO temperatures encountered at high altitudes do not sufficiently affect the properties of strong and tough metals to endanger the safety of the plane, according to tests made in the Air Corps laboratories. The tests were made to determine the tensile strength, hardness and other properties of ferrous and non-ferrous alloys at temperatures encountered during flight.

The standard temperature selected was -40 degrees C., which corresponds, approximately, to an altitude of 30,000 feet; the materials investigated included five nickel-chromium stainless steels, a number of aluminum-base alloys and magnesium-base alloys.

EXTEND INSTRUMENT FLYING

THE WAR DEPARTMENT plans to extend training in "blind flying" to Kelly Field, Langley Field and Chanute Field, following successful experiments at Wright Field, where four officers will be trained in instrument flying.

These officers, who will be assigned as instructors, are Capt. W. T. Larson, Lt. E. R. McReynolds, Lt. J. S. Griffith and Lt. J. E. Parker.

Eighty-five Graduated from Kelly

THE SEVENTEENTH CLASS of flying students trained under the Air Corps five-year expansion program was graduated October 14 from the advanced flying school, Kelly Field. Of the 91 cadets who started training last July, 85 successfully passed all tests and warranted graduation.

New Students Begin Training

ONE HUNDRED fifty-nine Air Corps aspirants, 84 of whom were graduated from West Point last June, started their primary training at Randolph Field on October 12. The class is made up of 55 men from civilian life, 14 enlisted men from the Air Corps and six enlisted men from other branches of the service, in addition to the West Point graduates.

After completing their primary and basic flying courses at Randolph Field, the men will take a final course in advanced flying at Kelly Field.

Moffett Field Hangar Lights Purchased

AN ORDER for twenty-four explosion-proof floodlights for use in lighting the airship hangar at Moffett Field, Sunnyvale, Calif., Naval Air Base, has been received by the Westinghouse Electric & Manufacturing Co. The Sunnyvale hangar now houses the *Macon*.

Explosion-proof floodlights were specified by the Navy Department, because airships inflated with hydrogen may be housed in the hangar occasionally. In the new Westinghouse floodlight the lamp is totally enclosed within a special refracting lens, which is designed to prevent explosions.

Navy Plans All-Metal Airship

PLEASED WITH the performance of the ZMC, its all-metal airship, the Navy is desirous of receiving an appropriation from the Government for the construction of a similar-type ship of the size of the Los Angeles for training purposes. Rear Admiral Ernest J. King, Chief of the Naval Aeronautics Bureau, reported that little has been found wrong with the ZMC and was surprised at its performance record.

The Navy hopes that when the more pressing needs of the fleet are met, an appropriation for an all-metal ship will be forthcoming.

Ban Army Planes for Civilian Flights

THE WAR DEPARTMENT has issued orders prohibiting the use of Army planes by non-military passengers, except in cases of emergency involving "life or catastrophe." The Department explained the action was taken because of lack of funds and "an ever-increasing demand by non-military passengers."

Begin Work on National Guard Hangar

GOVERNOR CLARENCE MARTIN shoveled out the first dirt for Spokane's new \$60,000 National Guard hangar as Major C. V. Haynes, formerly commander of the 116th Observation Squadron, Washington National Guard, flew in from Seattle in a pursuit plane. The Major made the trip between Seattle and Spokane in 1 hour 24 minutes.

Marines End Air Training

THE FOURTEEN-DAY annual training of officers and enlisted men of the Marine Corps Air Reserves based at Anacostia, D. C., has been finished at the Old Naval Air Station, since May, N. J. Activity centered around machine gunnery, dive bombing and wartime problems involving tactical maneuvers.

New Douglas Plane Delivered

A NEW DOUGLAS observation plane, type O-38 E, has just been acquired by the 103rd Observation Squadron, 28th Division Aviation, Pennsylvania National Guard. Powered with a supercharged P. & W. Hornet, the plane has a top speed of about 150 miles an hour.

Lt. Rinehart Heads Reserve Officers

THE AIR RESERVE Officers Association of the United States elected Lt. Arthur J. Rinehart, of Dallas, president when they met at their national council meeting recently.

Capt. William H. Beatty, Birmingham, was named judge advocate and Capt. Maitland C. Harper, of New York, national secretary-treasurer.

Curtiss

SELECTED THE FOLLOWING

United

AIRCRAFT PRODUCTS FOR THE

“Hawk”

- OIL TEMPERATURE REGULATORS

- FUEL PUMPS

- FUEL SYSTEM UNITS

- OIL AND FUEL LINE FITTINGS

THERE is no room on a military plane for anything but the best. In selecting the parts listed here, Curtiss insisted on products whose performance and dependability, in themselves, would match the performance of the “Hawk.” That these United Aircraft Products parts did deliver the kind of performance Curtiss specified is attested by the fact that they are “standard” on United States and foreign military “Hawks.” The same quality and dependability is available, in all United Products, to commercial aeronautics.

Our engineering staff is at your service, free of any obligation.

UNITED AIRCRAFT PRODUCTS, INC.
Dayton, Ohio

AMERICAN STEEL SHEETS

FOR ALL KNOWN USES



In the Aviation Field

Use sheet metal products of recognized reputation and value for hangars, shops, sheds, culverts, and similar purposes. Specify AMERICAN Black Sheets, Keystone Copper Steel Sheets, Apollo Best Bloom Galvanized Sheets, Formed Roofing and Siding Products, Culvert Sheets, Special Sheets, Tin and Terne Plates. Write for full information and literature.

This Company also manufactures USS Stainless and Heat Resisting Steel Sheets and Light Plates for all purposes to which these products are adapted.

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION



SAFETY IN THE AIR AND ON THE GROUND

REQUIRES MAXIMUM VISIBILITY OF THE PLANE AT ALL TIMES

ONLY ORANGE, YELLOWS AND REDS

WILL GIVE THIS TO YOU

ASK ANY PILOT WHO HAS CRASHED AND NOT BEEN FOUND FOR DAYS

Non-fading colors of high visibility, particularly adopted for use on a new type metal planes, have been developed by Berry Brothers and adopted as standard by leading American airlines. For technical information address our aviation division and a qualified representative will call without obligation.

ASK US MORE ABOUT IT

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AERONAUTICAL INDUSTRY

Schroeder, Boutelle in Aero Branch

FURTHER REORGANIZATION moves in the Aeronautics Branch of the Department of Commerce were undertaken by Eugene L. Vidal, director of the Branch with the appointment of Major R. W. Schroeder of Chicago and Richard S. Boutelle of Nashville. Schroeder was appointed chief of the Airline Inspection Service, and Boutelle, Aeronautic Development Expert.

The Air Regulation Division under the leadership of J. Carrol Cone, has been subdivided into three major units with Schroeder heading the Airline Inspection Service division, George E. Gardner the General Inspection Division and John H. Geisse the Manufacturing Inspection Division.

The Air Navigation Division has been divided into the Airway Maintenance and Airway Development divisions, while a third unit, Air Survey Section, will be directly under the office of Rex Martin, Assistant Director in charge of Air Navigation.

Luther H. Harris, who has been serving as chief of Air Line Maintenance Inspection, has temporarily been designated as Special Assistant to Mr. Vidal.

Furloughs for about 33 Washington Office employees have been issued in order to bring the Branch within its allotment for the remainder of this fiscal year.

Boeing Tests Executive Transport

AS THE first commercial transport type plane to be equipped with two-row engines, the all-metal, low-wing Boeing 247-A has been undergoing flight tests at Seattle, Wash., prior to its delivery to United Aircraft & Transport Corp., for executive use.

The new plane is identical with the Boeings being used on United Air Lines except for use of two-row P. & W. Wasp Junior engines in place of single-row Wasps; for the installation of eight cabin chairs instead of ten and for an exterior finish of aluminum lacquer.

The twin-row Wasp Junior has a rating of 650-horsepower at 2,400 r.p.m., and at an altitude of 7,000 feet. Performance figures on the 247-A are not yet available.

Aviation Securities Sold

NATIONAL AVIATION Corp., an investment trust, has purchased the principal assets of Aviation Securities Corporation of New England, obtaining, among other things, about 9,300 shares of Pan American Airways stock. With these shares National Aviation's holdings in the airline company amount to 74,447 shares, making it one of the largest, if not the largest, stockholder. In addition, a block of 36,500 shares of

Curtiss-Wright Corp. Class A stock was also included in the purchase.

With the completion of the deal, it was said that total net tangible assets of National Aviation amount to \$7,000,000, including holdings in Western Air Express, United Aircraft & Transport Corp., and Douglas Aircraft Corp. Recently, the company incorporated National Air Lines, which it intends to operate between New York and Washington. It also owns outright National Airport Corp., which owns the Washington Hoover Airport.

669,725 PASSENGERS FLOWN

CIVIL AIRCRAFT in the United States carried 669,725 passengers during the first six months of this year, according to Eugene L. Vidal, Director of Aeronautics. This compares with a total of 749,507 passengers carried during the similar period of 1932.

These passengers included 235,139 who rode on the scheduled airlines, and 434,586 who were carried by miscellaneous operators. Of the latter, 294,799 paid for their flights and 139,787 flew gratis.

The number of miles flown by all civil aircraft, including both passenger and non-passenger flights was 58,610,605, comparing with 58,391,099 during the first six months of 1932.

Ten Women Licensed Chute Riggers

OF THE 312 persons licensed by the Department of Commerce to repair and repack parachutes, ten are women.

The Air Commerce Regulations require that parachutes be repacked every 60 days and inspected for any possible flaw, with all work to be done by a licensed parachute rigger who is required to make any minor repairs necessary before returning the 'chute to its owner.

New Transport Nears Completion

CONSTRUCTION OF a new and fast bi-motor transport of all-metal design is nearing completion at the Burbank, Calif., factory of the Lockheed Aircraft Corp., according to Cyril Chappellet, secretary.

The new plane, known as the Electra, has provisions for 10 passengers, two pilots and a load of mail. With two supercharged P. & W. Wasp Junior engines, a top speed in excess of 200 miles an hour is expected.

Delivery of the first plane of this type to Northwest Airways is scheduled sometime this month and two more planes are due for completion shortly thereafter.

Deep Rock Opens Air Sales Unit

AN AVIATION sales division, headed by Farr Nutter, has been established by the Deep Rock Oil Corp. with offices at 155 North Clark Street, Chicago. The division has been organized to facilitate the handling of Deep Rock's sales to service hangars and transport operators, and it will operate directly through a sales force of representatives selected from operating personnel in the aviation industry throughout the country.

Mr. Nutter, long associated with aviation, was formerly sales director of the American Cirrus Company and flew the first section of the first transcontinental air mail run from San Francisco to New York in 1921.

When the Hunter brothers established their world's endurance record in 1930 they used Deep Rock Aero Oil and Gasoline.

Silk De-icers Undergoing Tests

SILK HAS replaced rubber in the new type de-icers which are now being tested by United Air Lines and the B. F. Goodrich Co., at Akron, Ohio. The new de-icers operate along similar lines to the rubber devices, but the latter were found too heavy and bulky for large transport planes. TWA, the "Lindbergh Line," used the rubber de-icers with some degree of success last winter.

New Air Company Incorporated

INCORPORATION PAPERS have been issued to the Interstate Aeronautical Corp., of Cleveland, Ohio, and the company has been authorized to issue 250 shares of no par common stock. Incorporators are A. Zucker, R. M. MacDowell and J. Albert Lowell.

Radio Experts Open Laboratories

RELEASED FROM the Bureau of Standards because of curtailment in expenditures and faced with the possibility of seeing five years of experimentation of many radio aids to flying go unfinished, a number of former government employees formed the Washington Institute of Technology and are now continuing their work in a new building and laboratory furnished by the organizer of the company, Lt. Col. Sidney F. Mashbir.

Among those on the staff of the new institute is Frank G. Kear, associate physicist on radio range beacon research at the Bureau; Gomer L. Davies and William H. Orton, on the Bureau's staff for a number of years and others who were practical men in the Bureau laboratory.

The new laboratory is now engaged in the practical application of the developments of the Bureau of Standards and the commercial adaptation of the blind landing apparatus and the radio direction finder.

(Continued on following page)

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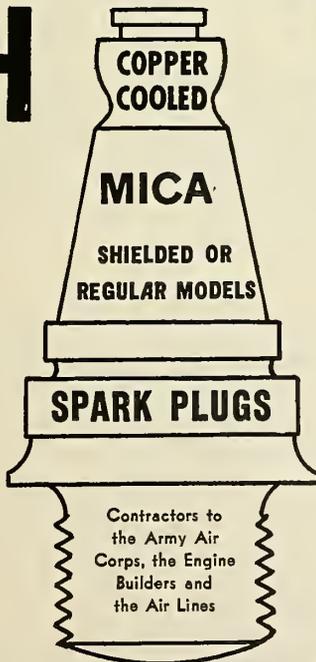
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(Continued from preceding page)

345 Flight Violations Heard

EIGHTY-SEVEN of the 228 flights in which violations of the Air Commerce Regulations occurred during the first six months of 1933 resulted in accidents, according to a study of the relation of aircraft accidents to violations of the regulations by the Department of Commerce. There were 345 flight violations in all, since some of the flights involved more than one infraction of the rules.

These violations were divided as follows: 71 low flying, 66 acrobatics, 28 licensed aircraft flown by unlicensed pilots, 15 flying without position lights, 12 flying without identification numbers, 12 dual controls connected during passenger flights and 141 miscellaneous. Penalties assessed included 28 civil penalties, 48 reprimands, 75 suspensions, 15 revocations, 6 denials of license. In 62 cases the charges were dismissed.

Shell Gets New Lockheed Vega

A DE LUXE model Lockheed Vega completely equipped with a Sperry automatic horizon, directional gyro, Westport radio receiver and a Smith controllable pitch propeller is now being flown by Maj. John A. Macready, chief of the Shell Oil Company aviation department, San

Francisco. The plane, powered by a Wasp S1D1 engine, has a top speed of approximately 200 miles an hour, and replaces another Vega in which Shell pilots have flown 2,000 hours during the last two years.

New Fast Fairchild Sold

THE FIRST of the fast, special Fairchild 22's has been delivered to Bryan Sheedy, well-known sportsman pilot of Long Island. This new Fairchild is entirely streamlined, has the lines of a racing plane and is powered with a Warner engine of 145-horsepower.

The design of this model follows closely that of the stock model Fairchild 22, except for its complete streamlining and its considerably greater power plant. It is generally powered by either Gipsy 90-horsepower, Menasco 125-horsepower or Cirrus 95-horsepower Hi-Drive engines.

Sportster Orders Keep Plant Busy

KINNER AIRPLANE and Engine Corp., Ltd., Glendale, Calif., is operating two shifts in some departments in order to keep abreast with orders for the K-5, 100-horsepower Sportster. The company has discontinued the manufacture of folding wings on its airplanes due to lack of approval of this feature by dealers and prospective customers.

Douglas Reports Profits

OPERATIONS OF Douglas Aircraft Co., and its subsidiary, the Northrop Corp., both of Santa Monica, Calif., for the nine months ended August 31, 1933, showed a gain in earnings for the period. Uncompleted orders on hand as of September 25, are valued at \$2,794,000 for Douglas and \$232,183 for Northrop. The report shows for Douglas: cash on hand, \$1,903,282; receivable from the government, \$44,737; marketable securities, \$754,946; materials on hand, \$204,137, and work in progress, \$910,502. Investment in Northrop is estimated at \$231,851.

Lockheed Delivers Six Orions

AMERICAN AIRWAYS has taken delivery of the last of six Lockheed Orions and within a short time will place them in service over its routes. In recent tests the planes showed a cruising speed of better than 206 miles an hour and an estimated top speed of 230 miles an hour.

Substitution of a trailing antenna for a radio mast gave the Orion seven miles an hour additional speed. The plane is powered by a supercharged Wasp S1D1 engine, and is equipped with the Smith controllable pitch propeller, which accounts for approximately seven miles an hour of the cruising speed of the Orion.

(Continued on following page)

Digest of Recent Events

Soviet Jumper Makes Record Delayed Fall

A NEW WORLD'S record for parachute jumping was made by a Red Army pilot, Victor Evceyef, who dropped 23,124 feet before pulling the rip cord. The former record was 17,500 feet, made by John Tranum, an Englishman. The American record was held by the late Spud Manning at 15,000 feet.

OCT. 12.

Harmon Trophy Goes to Turner

FOR HIS record breaking east-west and west-east transcontinental flights, Col. Roscoe Turner was awarded the Harmon Trophy, presented to him in New York by F. Trubee Davison, former Assistant Secretary of War for Aviation, Clyde Pangborn was the previous holder.

OCT. 16.

Charles Ulm Sets Air Record

ENGLAND AND Australia were brought within seven days of each other by the record-breaking flight of Charles Ulm, who flew from Feltham to Derby in 6 days 17 hours 56 minutes, beating Kingsford-Smith's new mark by 10 hours 54 minutes.

OCT. 20

Quantico Field Gets \$350,000

THE PUBLIC Works Commission allocated \$350,000 for improvements to the Marine Flying Field, Quantico, Va., various portions of the money going for hangars, relocation of hangars, distributing systems, road and walk paving and gasoline storage and distribution. For the improvement of the Naval Air Station flying field at Hampton Roads, \$17,000 was made available.

OCT. 16.

Lakehurst Base To Remain Open

LIMITED TRAINING activities will be conducted at the Naval Air Station, Lakehurst, N. J., and eight officers and 30 men will begin training there early next year. It was previously announced that the station would be closed after the *Macon* left for its base in Sunnyvale, Calif.

OCT. 13.

Macon Safely Housed In Sunnyvale Home

MORE THAN 30,000 persons acclaimed the Navy dirigible *Macon* when she landed at her new home in Sunnyvale, Calif., after completing a non-stop flight from Lakehurst, N. J. The dirigible is scheduled to participate in the battle maneuvers with the main force of the fleet in Pacific waters this winter.

OCT. 15.

Italy Receives Thompson Trophy

AMBASSADOR AUGUSTO Rosso was presented with the Thompson Trophy at the Italian Embassy in Washington in recognition of Lieut. Francesco Agello's flight of 423.522 miles an hour, a new world's record. Lieut. Agello, a member of the Royal Italian Air Force, will retain a miniature replica of the trophy.

OCT. 13.

Navy Planes Make Long Formation Hop

FIVE NAVY seaplanes, the same flying boats and personnel that established a non-stop formation flight from Norfolk to Coco Solo, flew into San Diego from Acapulco, a distance of 1,644 miles, after having taken off from Coco Solo previously. The entire trip of 2,692 miles took almost 19 hours.

OCT. 13.

Coming Events

German air sport exhibition at Hanover, Germany.

NOVEMBER.

Annual Assembly and Conference. Scientific Society for Aeronautics. Technical High School, Berlin, Germany.

NOV. 6-7.

Metropolitan Section, Society of Automotive Engineers. Aviation night. Hotel New Yorker, New York, N. Y.

NOV. 16.

Second International Egyptian Aviation Meeting at Cairo, Egypt, under Aero Club of Egypt auspices.

DEC. 18-24.

Thirty-second Annual Confer-

ence of the Fédération Aéronautique Internationale, at Cairo, Egypt.

DEC. 20-29.

Annual Dinner, Society of Automotive Engineers, New York, N. Y.

JAN. 8, '34.

Sixth Annual Miami All-American Air Races at Miami, Florida.

JAN. 11-13, '34.

Annual Meeting, Society of Automotive Engineers, Detroit, Mich.

JAN. 22-25, '34.

Dedication and opening, Shushan Airport, New Orleans, La. Air races and events.

FEB. 9-13.

(Continued from preceding page)

Aircraft Mechanics Buys Plant

EQUIPMENT OF the Alexander Aircraft factory at Colorado Springs, Colo., together with jigs and dies for the manufacture of the Eaglerock, Flyabout and Bullet planes and the approved type certificates for these planes have been purchased by Aircraft Mechanics, Inc., which has been operating the factory for the past year on a lease.

According to P. W. Nichols, president, operations have included the manufacture of Eaglerocks and Flyabouts and spare parts for these ships as well as

repair work on all types of planes. These activities will be continued in the future and in addition, the company expects to produce a new plane which should be ready by the spring of 1934. Other activities include the manufacture of power driven wood tools and repair station equipment.

General Electric Moves N. Y. Offices

THE NEW GENERAL ELECTRIC building at 51 Street and Lexington Avenue in New York City is now housing the General Electric company's offices which were moved from the downtown district.

Charles E. Thompson Dies

A STROKE suffered while he was in Washington, assisting in the writing of the NRA code for automobile parts manufacturers, proved fatal to 63-year-old Charles E. Thompson, founder and president of Thompson Products, Inc., and pioneer in the development of valves and other parts for aircraft and automobiles. Mr. Thompson was actively connected with the aeronautical industry, having at one time been president of the Glenn L. Martin Company and an organizer of Transamerican Airlines, now part of American Airways.

Mr. Thompson established the Thompson Trophy Race, annual air speed classic of the National Air Races, and in accordance with his wishes, his ashes were scattered over Cleveland by one of his pilot friends, Jimmie Doolittle.

Udet Buys Hawk for Acrobatics

ONE OF the latest type Curtiss Hawk single seat pursuit biplanes was delivered to Major Ernst Udet for his aerial acrobatic work. The Hawk is powered by a Wright Cyclone engine of 700-horsepower, has a top speed of 206 miles an hour and dives at speeds exceeding 360 miles an hour.

Equipped with the Curtiss single-strut landing gear and stressed for the strains of acrobatic flying, the plane was put through a series of tests by the German flier. It is similar to the Curtiss Hawks delivered to the United States Navy and those sold to China.

Fly More Miles Per Accident

CIVIL AIRCRAFT used in miscellaneous operations flew 42,808 miles per accident in the first half of this year, according to Eugene L. Vidal, Director of Aeronautics. Miles flown per fatal accident during this six-months' period were 409,356 and miles flown per passenger fatality were 629,779.

During the period January-June 1932, there were 39,814 miles flown per accident, while miles flown per fatal accident were 354,976 and miles flown per passenger fatality were 591,626.

Miscellaneous flying includes student instruction, experimental, commercial (exclusive of scheduled air transport) and pleasure flying. Causes of accidents in this category during the period considered were divided as follows: Personnel, 51.39 per cent; engine failure, 19.89 per cent; airplane failure, 10.43 per cent; miscellaneous (including weather, darkness, airport or terrain, etc.), 17.64 per cent; undetermined and doubtful, 0.65 per cent.

Kinner Names Santa Barbara Dealer

THE KINNER Airplane & Motor Corp. Ltd., of Glendale, Calif., has announced that Santa Maria Air Lines, Inc., has appointed its aircraft dealer for Santa Barbara County.

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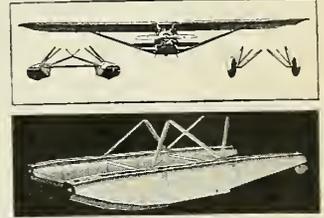
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STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS, MARCH 3, 1933 of AERO DIGEST, published monthly at New York, N. Y., for October 1, 1933.

State of New York, } ss.:
County of New York, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Frank A. Tichenor, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the AERO DIGEST, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Aeronautical Digest Publishing Corp., 515 Madison Avenue, New York, N. Y.; Editor, George F. McLaughlin, 515 Madison Avenue, New York, N. Y.; Managing Editor, None; Business Manager, Frank A. Tichenor, 515 Madison Avenue, New York, N. Y.

2. That the owners are: The Aeronautical Digest Publishing Corp., 515 Madison Avenue, New York, N. Y.; Frank A. Tichenor, 515 Madison Avenue, New York, N. Y.; Jessie H. Tichenor, 515 Madison Avenue, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) FRANK A. TICHENOR.

Sworn to and subscribed before me this 20th day of September, 1933.

(Signed) ANNA HIGGINS,

Notary Public, New York County Clerk's No. 538.

Queens County Clerk's No. 2643.

(My Commission expires March 30, 1934.)

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FOREIGN NEWS IN BRIEF

Australasia

The Federal Cabinet has prepared the conditions which must be met by bidders for the overseas and associated internal Australian air services. It is believed that Cootamundra will be made the terminal for the subsidized mail route and that a new route will be placed in operation between Charleville and Brisbane by way of Roma.

ADDITIONAL FUNDS will be provided by the government to further experiments in aerial photography as applied to geological investigations. This type of photography has been found invaluable in the search for surface indications of oil. The Commonwealth Geological Advisor has been conducting aerial photography with the cooperation of the Royal Australian Air Force for the past two years.

WEST AUSTRALIAN Airways, Ltd., has moved into a new building after celebrating its 11th anniversary. The company now flies 2,650,515 miles over more than 3,500 miles of airways and reports satisfactory increases in traffic following fare reductions made for winter operations.

THERE ARE now 112 aircraft owners in Australia, almost three times as many as there were four years ago. In addition there are 58 government, 108 public and 132 emergency airports.

THE SINGAPORE to Australia air line which has been planned as part of the London-Australia service will not be operated before June, 1934. Conditions for letting of the contract are being printed and are expected to be advertised soon, but it will be at least four months before bids will be closed.

RECENT REDUCTIONS in fares over the Perth-Adelaide route flown by

West Australian Airways, Ltd., have resulted in a 40 per cent increase in passengers and a 20 per cent increase in revenue. The reductions were made as part of a plan to operate at capacity during the winter months.

Canada

Aviation activities in Canada seem to have dropped slightly. A comparison of figures of licenses and certificates in effect on December 31, 1932 (in parentheses), and July 31, 1933, indicates the following: private pilots, 340 (356); commercial pilots, 402 (419); engineers, 381 (341); aircraft, 331 (348); airports, 102 (91).

GOVERNMENT FLYING schools may have fewer flying hours than at any time since 1928, according to the performance figures for the first half of the year when only 4,000 hours were flown. Last year almost 11,000 hours were logged by 23 clubs. Thus far the Winnipeg Flying Club has the most hours, followed by the Toronto Flying Club.

Germany

The annual meeting and conference of the Scientific Society for Aeronautics is being held in Berlin with the program comprising a series of remarkable reports and lectures relative to the study and practice of aeronautics.

DEUTSCHE LUFTHANSA carried 39,471 passengers, 763,176 pounds of baggage and 350,990 pounds of mail during the first six months of operations this year. During that period its planes flew almost 2,300,000 miles, and it is noted that a 10 per cent increase in mileage has augmented traffic in all branches.

Great Britain

Imperial Airways is offering a pleasure tour by air and on October 10 flew its

four-engined *Helena*, one of the 38-passenger planes flying the London-Paris route, to Egypt and the Mediterranean via France, Italy and Northern Africa. The tourists were allowed sightseeing in Rome, Naples, Cairo and other cities along the route.

A NEW LARGE twin-engined monoplane is nearing completion in the Avro company's factory in Manchester. The plane will have accommodations for 16 passengers and is intended for service over the routes flown by Midland and Scottish Air Ferries, Ltd.

AIR MAIL service from London to Rangoon was inaugurated by Imperial Airways as another link in the 10,000-mile route connecting England with Australia. The new line is an extension of 700 miles from Calcutta to Rangoon, bringing the total mileage from London to 7,200. Another section from Rangoon to Singapore will, it is hoped, be opened by or before Christmas.

A REVISED and enlarged edition of the British Standard Glossary of Aeronautical Terms has just been published by the British Standards Institution. The new glossary, divided into 14 parts, contains a list of words in current use in airplane and airship design and operation, with definitions showing the correct meaning and usage of each.

Italy

Following an agreement between the Ministry and the city officials, work on the new Milan airport will be undertaken immediately. When completed the airport will include work shops, passenger facilities, hangars and a complete flying boat base installation.

THE THIRD air pageant of the Royal Italian Air Force will be held on June 3, 1934. This annual affair usually gives a good impression of the skill and ability of the air force and demonstrates the latest type of equipment to the public.

COL. MARIO DE BERNARDI, Major Francesco Brak Papa and Capt. Prospero Freri, air reserve fliers, have been awarded the Gold Medal for their long service in the air corps.

SOCIETA CAPRONI recently produced a new experimental ship designed as a low-wing cantilever monoplane. The ship has a top speed of about 137 miles an hour and a ceiling of 16,404 feet. It is powered by a 130-horsepower Farina T-38 engine and is provided with flaps.



The Italian C.R. 30 which averaged 221 m.p.h. from Rome to Bucharest

COMPETITORS IN the Bibesco Trophy speed race will have to exceed a speed of 221 miles an hour if they are to win the event this year. The race for the trophy is contested over a route between Rome and Bucharest by Italian and Roumanian military pilots and at the end of three years the pilot recording the best speed between the two points will be awarded permanent possession of the trophy.

Recently Capt. Baldi and Lieut. Buffa, Italian pilots, flew between the two cities in a C. R. 30 powered by a 650-horsepower Fiat A.30 and averaged about 221 miles an hour.

Mexico

Permission has been granted by the Ministry of Communications for the establishment of five airways on an experimental basis. The Baughan Aviation Co. will operate between Mexico City and Guadalajara while Servicio General Aero will fly four routes between Mexican west coast and southwestern cities. At the end of 60 days, the operators will be allowed to apply for permanent franchises.

SIX KINNER-powered Fleet planes were delivered in Mexico City after a flight from Buffalo, N. Y. Mexican pilots flew the planes from the factory to the capital where they will be used as training planes for the Mexican army's aviation arm.

TRANSPORTES AEREOS Mexicanos, S. A., headquartered in Mexico City, has inaugurated a daily passenger, mail and express service between Mexico City and Acapulco. The route is 395 miles long.

SPARTAN AIRCRAFT CO., Tulsa, Oklahoma, has been the recipient of an order for six planes from the Ministry of War and Marine, it is said. The planes will be added to the aerial equipment of the First and Second Air Regiments of the army.

Portugal

Junkers Junior aircraft, powered with Siddeley Genet Major engines, won three out of the four prizes at the recent Portuguese Air Display at Lisbon. Lieut. P. Abreu took first in one of these ships.

THE LINEAS Aereas Postales Espanolas (L.A.P.E.) have placed an order with the Fokker Co. in Amsterdam, Holland, N. V. Nederlandsche Vliegtuigenfabrik, Ltd., for three Fokker F VIIb-3m ten-passenger planes, each to be equipped with three Armstrong Siddeley Double Mongoose (Ser-val) 340-horsepower engines.

The company operates daily services between Madrid and Barcelona and between Madrid and Sevilla. In the course of this year a new line will be opened between Sevilla and the Canary Islands via Cape Juby (Rio de Oro) for which service the new equipment is desired. A line from Barcelona to the Balearic Islands also is planned.

South America

Schedule tie-ups between planes of the Scadta System and Uraba, Medellin & Central Airways, Inc., enables quick connections between Bogota and Cristobal. Scadta planes now leave Bogota at 7.40 a. m. on Wednesday and Sunday and arrive at Medellin in time to transfer passengers and other cargo to the "Umca" plane which leaves at 10.45 a. m. and arrives at Cristobal at 3.30 p. m. In the other direction, "Umca" planes leave Cristobal at 6 a. m. Tuesday and Friday and arrive at Medellin in time to make a Scadta plane bound for Bogota.

THE BRAZILIAN Department of Civil Aeronautics has received bids for the operation of a weekly service between Belem and Manaus and between Sao Paulo and Campo Grande. In its request for bids, the Department specified that planes must be manned by Brazilian pilots and must be capable of carrying at least

four passengers in addition to mail and express. Seaplanes or amphibions must be used on the Belem-Manaos line.

SOCIEDADE ANONYMA Empresa de Viacao Aerea Rio Grandense has completed its first year of operations in Brazil with a record of flying 128,806 miles in 1,422 hours with 1,662 passengers, 2,304 pounds of mail and more than 50,000 pounds of express. It is planned to extend the company's southern route to Rio Grande and its central route to Alegrete and Uruguayana.

Spain

The Spanish Government has purchased the right to manufacture the Czechoslovakian Walter Junior 4-cylinder water-cooled engine.

IMPROVEMENTS at the Grando Airport in the Canary Islands include the construction of a large hangar, installation of underground fuel tanks and the construction of a concrete apron.

SPANISH AIR Mail Lines has acquired three tri-motored Fokkers for an air mail service between Seville and Grando Airport, Canary Islands. Mail will be carried twice a week in each direction.

A NEW company, recently organized at Bilbao with Spanish and Italian capital, will build Caproni planes in Spain.

A SPANISH Air Annual has just been published by Ediciones Herald Deportivo of Madrid. The book gives information of the official services of the country, conditions of flight, airports, landing fields, schools, pilots, personnel and other interesting data together with a complete set of route maps.

Switzerland

The Fokker Co. in Amsterdam, officially known as N. V. Nederlandsche Vliegtuigenfabrik, Ltd., manufacturers of commercial and military airplanes, has licensed the Swiss War Office to make the Fokker CV, high-performance, two-place sesquiplane, in Switzerland.



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TRADE LITERATURE

Aeronautical Occupations

• INCLUDED IN a 36-page booklet issued by the Boeing School of Aeronautics, Oakland, Calif., is a complete table of aeronautical occupations, listing requirements and duties of various aviation positions. Incorporated in the latest issue of the Boeing catalog under this table are such classifications as: pilot, approved school flight instructor, sales pilot, test pilot, traffic representative, airplane and engine mechanic, instrument man, radio technician, ground school instructor, field manager and aeronautical engineer.

Copies of the catalog may be obtained from T. Lee, Jr., general manager, Boeing School of Aeronautics, Oakland Municipal Airport, Oakland, Calif.

Maintenance Shop Lathes

• "UNDERNEATH BELT Motor Driven Lathes" has been issued to illustrate and describe eight sizes and types of South Bend underneath belt motor driven lathes. These lathes are of the back-geared screw cutting type,

adaptable for general repair shops and the like. Lathes shown range from nine to 18-inch swing and in bed lengths from two and a half to 14 feet. Jobs such as armature commutator truing, bushing making, valve refacing, piston finishing, etc., may be accomplished by the machines shown. In addition to the above, there is shown a complete range of countershaft drive lathes. Copies may be obtained from the Technical Service Department, South Bend Lathe Works, South Bend, Ind.

Emulsified Asphalts

• A GROUP OF four papers, presented at the Tenth Annual Asphalt Paving Conference held in New Orleans, is contained in a booklet issued by the Headley Emulsified Products Co., of Marcus Hook, Penn. The material contained in these addresses, each prepared by an authority on the subject of emulsified asphalt and its uses, should be of interest to airport officials and others who specialize in airport construction, particularly from the paving angle.

Pioneer Instruments

• A BRIEF showing of aircraft instruments manufactured by the Pioneer Instrument Company, Inc., is included in a booklet prepared to illustrate and describe the more important instruments made by the company. Most illustrations show the instruments in actual size.

Aircraft In Nickel

• EDITORIAL COMMENT, lauding the flights of Wiley Post and General Italo Balbo and a news item concerning the new Boeing transport appear in Nickel Steel Topics for August. Use of nickel steel in aircraft engines and airplanes is noted, particularly in the Pratt & Whitney Wasp and Hornets which use nickel alloy steels for most parts. The crankshafts and master rods are of modified S.A.E. 3140 nickel-chromium steel, and the link rods of S.A.E. 2340, 3½ per cent nickel steel. S.A.E. 2512, five per cent nickel steel is used for the cam reduction gears and various other nickel alloy steels for the propeller hub, gears, shafts, etc.

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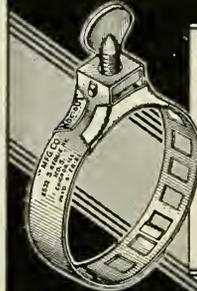
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AN INVESTIGATION:

• We made a check of the various American aeronautical magazines recently, to see how much the readers of each were getting for their subscription price.

RESULT:

AERO DIGEST, for the first ten months of 1933, averaged approximately 41½ editorial pages per issue; the next largest aeronautical magazine averaged slightly less than 35½ pages for the same period. † To Aeronautical Engineers the following check-up should be very interesting: For the same ten months period, AERO DIGEST published, in its Aviation

Engineering section, an average of 11½ pages per issue of technical material. This represents 27.9% of the total editorial content—more, by a wide margin, than that of any other American aeronautical magazine. † AERO DIGEST, with the largest technical department, the largest technical staff and the greatest number of technical features written by well known aeronautical engineers, is your kind of magazine.

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 2. Commercial operators — when writing for Douglas' catalog, please clip the coupon to your letterhead. (Page 9)
 3. "The Aeronca" is the title of an interesting booklet describing the Aeronca plane. Available to potential purchasers of light planes. (Page 67)
 4. Airline and commercial operators, private fliers, business houses—write for "Bellanca Leads the Way!" — a booklet on Bellanca dependability and performance. (Page 4)
 5. Air Corps officials are invited to write for Curtiss' booklet on the "Hawk" pursuit plane for domestic and foreign military service. (Page 55)
 6. Commercial operators, private fliers — Fairchild introduces a new model. Write for your copy of their descriptive literature. (Page 7)
 7. Commercial operators and other users of high speed aircraft—you will be interested in Lockheed's literature. (Page 31)
 8. Waco's line includes their popular high performing open and closed aircraft. Potential purchasers are invited to write for Waco's illustrated literature. (Page 33)
- ## ENGINES
9. Pratt & Whitney's booklet describes for engineers, aircraft builders and operators, the salient points of "Wasp" and "Hornet" engines. (Second Cover)
 10. Airlines, commercial operators and engineers are invited to write for the literature describing Wright liquid and air-cooled engines. (Page 3)

AIRCRAFT AND ENGINE EQUIPMENT

11. For aircraft finishing information, see Berry Bros.' catalog of colors and finishing suggestions. (Page 63)
12. Dealers and all users of aircraft are invited to send for literature concerning B.G. Spark Plugs. (Page 2)

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13. Valves—for new engines or for replacements—are described in the Thompson literature for engine builders and repair stations. (Third Cover)
14. Repair stations and aircraft and engine builders write for Wittek's literature on "the hose clamp with the thumb screw." (Page 72)
15. Aircraft operators, pilots, dealers, builders—Good-year offers you an interesting catalog concerning the Air-wheel. (Page 21)
16. If you are in the market for steel propellers, including controllable pitch, write for Hamilton Standard's descriptive literature. (Page 11)
17. National Tube offers to aircraft manufacturers complete literature covering various types of aircraft tubing. (Page 39)
18. Automotive Fan & Bearing Co., manufacturers of aircraft wheels and brakes, invites engineers, manufacturers and dealers to write for their literature. (Page 56)
19. Engineers, manufacturers, operators—get Eclipse's booklet on aircraft starters, generators, etc. (Back Cover)
20. Engineers and builders—do you have a copy of Hartshorn's literature on tie rods and streamline wires? (Page 59)
21. Pilots, operators, dealers—be sure to obtain the booklet describing Hurlay-Townsend spark plugs. (Page 65)
22. Manufacturers and other users of plywood, Haskelite's literature contains some interesting information on plywood quality. (Page 59)
23. Users of aircraft fabric, write for Thurston's literature on Dartmouth-Tex, the fabric which is used on the Curtiss "Hawk", Admiral Byrd's "Condor", etc. (Page 57)
24. Manufacturers of military and commercial aircraft—United Aircraft Products Co.'s literature describes a number of products which you can use. (Page 63)
25. If you're thinking of buying an aircraft radio, write for the Westport booklet. (Page 71)
26. Ronald Press Company offers a plan regarding the purchase of their technical books on deferred payments. (Page 80)
27. The Air Line Pilots Association has on file a list of experienced line pilots available for positions. Aircraft operators, please write. (Page 69)
28. The Gov't Surplus Company's catalog contains descriptions of a complete line of flying clothes. (Page 58)
29. American Sheet & Tin Plate's literature contains interesting data for those who plan the construction of hangars, shops, sheds, culverts, etc. (Page 63)
30. Employed mechanics, if you wish to earn additional income, see the advertisement headed "Opportunity." (Page 69)
31. Potential purchasers of aircraft radio will be interested in the RCA Victor literature. (Page 1)
32. Plane owners, aircraft dealers, Johnson's booklet explaining the value of waxing planes is worth writing for. (Page 68)

SCHOOLS

33. For expert ground or flight training, write for the Boeing School literature. (Page 37)
34. Prospective students, write for the Dallas School catalog and schedule of prices. (Page 8)
35. The Spartan School's booklet describes the thrilling student flights during the tours of "The Dawn Patrol." (Page 41)
36. The Lincoln School invites you to write for their catalog of ground and flying courses. (Page 72)
37. The Penn School of Aviation invites pilots and mechanics-to-be to write for their catalog of courses and tuition. (Page 65)
38. The Roosevelt School's literature describes fully all flight and ground courses, for prospective students. (Page 67)
39. Students interested in home study aviation courses are invited to write for the Columbia "Tech" catalogue. (Page 69)
40. Prospective students—write for a copy of "Skyward Ho," describing all aviation courses taught by Parks Air College. (Page 5)

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FOR SALE OR TRADE: J-5 Stinson SMID, licensed, in good condition, \$850; Great Lakes Trainer, late model, perfect condition, less than 150 hours total time, air wheels, brakes, etc., \$975. Will consider Curtiss Fledgling in good condition part payment. Write or wire C. W. March, 2160 Payne Ave., Cleveland, Ohio.

STEARMAN J-5: In perfect condition, just relicensed. Motor just major overhauled. Black fuselage and gold wings; completely refurbished. Always privately owned. Best used airplane in South. \$1,400. Viking Flying Boat Co., Box 3302, Miami, Florida.

STINSON LYCOMING JR.: Licensed April '34; very clean; guaranteed perfect; turn and bank, rate of climb. Some buy \$1,385. Jones Auto and Airplane Sales, 121 Alexander St., Rochester, N. Y.

TRAVEL AIR E-4000: J-6-5. Just recovered. Lights, brakes, starter, airspeed. Looks and flies like new. No reasonable offer refused. Elmer Schmidt, 2336 Flora, Cincinnati, Ohio.

STINSON LYCOMING: Model R, 1933 refinements, like new, \$3,500. Red leather, \$300 extra. Cost \$5,900. Trade new bungalow, improved farm, paying business. Dr. Haynie, Fremont, Nebraska.

FOR SALE: Cracked Fairchild KR-34, J-6-5, oleo struts, semi-air wheels, Standard Steel propeller. For quick sale, \$500 cash. For additional information, write Ratus Flying Service, Greensboro, N. C.

BUHL AIRSEDAN: New, 8-place; powered with Wright Cyclone; reasonably priced. Completely equipped and licensed. Hartung Aircraft Corp., Box 27, Harper Station, Detroit, Michigan.

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STEARMAN J-6-7: Sale or trade. Ship completely recovered and engine major in April. Extra equipment; semi-air wheels, pants, ring, instruments in front cockpit, metal cover for front cockpit, sliding windshield and enclosure for rear cockpit. Want to get Warner Monocoupe. M. L. Short, University Club, Hartford, Connecticut.

FOR SALE: Stinson Senior, \$800. Townsend ring and flares. Equipped for night flying. Completely recovered. Kinner Lincoln, \$700. Licensed. Perfect condition. H. D. Berg, 105 W. Adams St., Chicago, Illinois.

KINNER KITTY HAWK: Three-place open. Privately owned. Good condition. Licensed September 1934. 90 hours since major. Very stable, excellent trainer. Cheap to operate. \$745 for quick sale. W. P. Corrington, 1220 W. 9th, Cleveland, O.

SACRIFICE: Stinson, Lycoming motor just major; de luxe model; turn bank, rate of climb, electric flares, landing lights, semi-air wheels, perfect condition, \$1,575. **AERO DIGEST, Box 1652.**

FOR SALE: Spartan hiplane, 3-passenger, dual controls, motored with Walters 120 h.p. engine; Hamilton steel propeller. Engine and plane completely rebuilt. Reasonably priced. State Trade School, P. O. Box 446, Putnam, Connecticut.

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REARWIN JR.: Two-place winter enclosure; air wheels; Aeromarine 50; just top overhauled; perfect condition. Located Hadley Airport, New Brunswick, N. J. Sacrifice for cash. Inquire **AERO DIGEST, Box 1653.**

FOR SALE: Sikorsky '38"; Lockheed Vega, Air Express and Sirius; Wasp Bullanca; Travel Air 6000; Loening Air Yacht; Challenger Travel Air; J-5 Stearman; Lycoming Stinson; Warner Fleet; 100 Kinner Bird; Warner Aristocrat. Aero Brokerage Service of N. Y., Roosevelt Field, Mineola, New York.

CHALLENGER ENGINE: Just major overhauled, little total time, looks brand new; complete with starter, \$295. Worth \$450 easily. Western Airplane Distributors, 600 Graphic Arts Building, Kansas City, Missouri.

PITCAIRN AUTOGIRO: Two-place; Heywood starter; metal propeller, lights; factory checked; condition and appearance like new; Kinner 125, 45 hours; licensed August 1934. Sacrifice for cash. Located at Hadley Airport, New Brunswick, N. J. Inquire **AERO DIGEST, Box 1654.**

Miscellaneous Products & Equipment For Sale

ENGINES, bought and sold; all parts and accessories, 50% to 70% off list. Special: Great Lakes, in excellent shape, inverted motor, just modernized, \$1,500. Moth, \$600. Fairchild 21, \$1,100. Engines complete: Lycoming; Gipsy; Cirrus Mark II; new inverted Cirrus, \$250; Wasp B parts for all engines. We buy crack-ups, Aircraft Salvage Co., 48-03 Ditmars Ave., Astoria, L. I., N. Y.

FOR SALE: B. B. T. 1,000 millimeter floodlight lens, new, same as used by leading airports. Sacrifice. **AERO DIGEST, Box 1645.**

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COMPLETE new steel portable hangar, specially built. Electricity, air compressor, 550 gallon gas tank, pump, wind sock. 40 x 40 x 14. \$1,700. J. McPerson, Abington, Pennsylvania.

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Positions Wanted

TRANSPORT PILOT, with Aeronautical Radio rating. Business college graduate. Instructing experience. Good references. Single. Go anywhere for flying time and expenses. Edwin Utgaard, Leesburg, Virginia.

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TRANSPORT PILOT: With S.A.T.R.; 34, married; 4000 hours. Flown mail five years. Excellent record. Any decent proposition acceptable. References. **AERO DIGEST, Box 1643.**

TRANSPORT PILOT with thousand hours flying experience desires change. Licensed instructor and mechanic. Speaks Spanish and Portuguese fluently. Desires connection, preferably in South America. **AERO DIGEST, Box 1647.**

PILOT: Plenty of ability, available for position as pilot, operations, traffic work, factory, distribution or private flying; graduate Manlius Military Academy, Columbia University Business Extension, Roosevelt Aviation School; background includes: mechanical, sales, business and flying experience; transport graduate. **AERO DIGEST, Box 1651.**

YOUNG MAN, 19, desires position to gain experience on aircraft and engines. Mechanically inclined. Ambitious. Will travel. Salary secondary. Arnold Haines, Route 1, Ontario, California.

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PRIMARY TYPE GLIDER for sale. Less cables, wire bracing and covering. Photo sent on request. No reasonable offer refused. Charles J. Conrad, R. R. 2, Oxford, Ohio.

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Miscellaneous Services Opportunities, Offers, etc.

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EXPERT REPAIR WORK: All types, at moderate prices. Approved Repair Station No. 163. We have immense supply all aircraft materials, at rock bottom prices. Aircraft Mechanics, Inc., Colorado Springs, Colorado.

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BROTHER, CAN YOU spare a dime? If you can, send it to me and I'll send you my 1933 Low Price Aviation Material Catalog, Karl Ort, 698 W. Poplar Street, York, Pennsylvania.

FOR SALE CHEAP: Metal hangar and lease of field; fine student and passenger business, located by large city. For full particulars write AERO DIGEST, Box 1642.

WE CAN OVERHAUL your Scintilla magnetos for Kinner engines so they will really start. Highest quality magneto service, at reasonable prices. Estimates given if desired. Streed Electric, 1312 Harmon, Minneapolis, Minnesota.

SAVE ON that motor overhaul. Let me estimate on your top and major overhauls. Approved for all commercial motors. Gerry Moller, New Canaan, Connecticut.

WHAT YOU HAVE BEEN WAITING FOR: For Sale: Licensed OX Eaglerocks, Challengers, Wacos, etc., prices from \$490 to \$790. With each ship purchased goes complete flying course, including gasoline and oil. Why pay more, when we can teach you to fly for less and you have your own ship to build up time for a transport license. Or, if you do not wish to own a ship, we will teach you to fly for \$6.50 per hour dual and \$4.75 per hour solo. Ground course free. How do we do it at these prices? Owners are operators, with low overhead and we are satisfied with a small profit. Learn to fly in Pennsylvania with veteran Transport Pilots of barnstorming days and you can fly anywhere. To convince you that our methods are right, demonstration flight free. Spanish students solicited. Don't write—COME, as all facts are stated above and we have no stenographers to increase our overhead expense in useless correspondence. New Way Flying System, Bellefonte, Penna. Box 132.

Wanted To Buy Or Trade

WANTED: B-3, J-5 powered Ryan brougham. Give complete details in first letter. Also English Moth with spare English Gipsy motor. AERO DIGEST, Box 1641.

WANTED: Right upper and lower wings for Waco Ten and Great Lakes. Uncovered acceptable, if priced right. Robert J. Reeves, Durham, North Carolina.

WANTED: American Cirrus motors and parts. State price, condition. H. D. Berg, 105 West Adams Street, Chicago, Illinois.

WANTED: Lockheed or Orion, with or without motor, for cash. Must be bargain. Condition no object. Blue Bird Air Service, 5214 West 63rd St., Chicago, Illinois.

WILL TRADE J-5 Waco or J-5 Travel Air for Warner or Lambert Monocoupe, or Warner Waco or Bird. Milton Hersberger, Put in Bay, Ohio.

TRADE N-B TRAINER: Valued eight hundred on Lycoming Stinson. Want Monoprep landing gear parts: left side, short oleo type. Ray Baumgardner, Fort Stockton, Texas.

WANTED: Curtiss Seagull flying boat. Must be licensed. Give cash price. G. Konz, 252 Avenue "C," Rochester, New York.

WANTED: Velie Monocoupe, less motor. Must be licensed and in good condition. Priced right for cash. Box 502, Fort Pierce, Florida.

WANTED MOTH: Wright Gipsy, steel fuselage. Must be good, licensed, instruments and cheap. Give all particulars in letter. Walter L. Dusenberry, 32 Sixth Ave., New York, N. Y.

WILL PAY CASH for modern planes, two-, three- or four-place, open or closed, any condition. State price and details in first letter. AERO DIGEST, Box 1650.

WANTED: Stinson Jr. or similar ship, in good condition. Must be reasonably priced for cash. All details in first letter. Clayton Lemon, Roanoke Municipal Airport, Richmond, Virginia.

WANTED TO BUY: Late Stinson Robin or Monocoupe. Price must be reasonable. Will pay cash. Describe fully operating history; age, covering, total hours, overhauls, if any, and date re-licensed. Address: Frank J. Wewerka, Osage, Iowa.

WANTED: J-5 Lockheed Vega. Must be in good condition. Pay cash; no trades. Waco 10 for sale; 400 hours; Scintilla magneto; \$325. Stanley Fuller, Milford, Iowa.

WILL TRADE: Real estate, farm land, stock or cash for late model Stinson or Bellanca. Mail full particulars to A. E. Beck, 411 Merchants National Bank, Omaha, Nebraska.

WANTED: One second-hand anemometer in good condition. State what you have and price of same. Eckel's Air Service, Inc., Washington, N. J.

HAVE CASH for Taper Winged Waco, Stinson, Fleet, Davis and Aeromca; in need of recovering or repair preferred. Must be extraordinary bargains. Indiana Air Service, Municipal Airport, South Bend, Indiana.

WANTED: Used Fairchild cabin 24, with either Cirrus or Warner. Have for trade either cash or Sport Travel Air B-5 Kinner; ship just overhauled and recovered. Montgomery School Aeronautics, Montgomery, Alabama.

WILL TRADE: Master Six Buick sedan, new condition throughout, low mileage, for plane; one-, two- or three-place, OX or what have you? AERO DIGEST, Box 1648.

CASH PAID for Waco F: Must be first class condition. Give full information and lowest cash price, first letter. H. Leslie Jones, Fort McKavett, Texas.

WANT NEW J-5 motor, motor mount and cowling for Curtiss Fledgling. Have Kinner and Challenger motors for sale cheap. Also cracked Fledgling. Western Airplane Distributors, 600 Graphic Arts Building, Kansas City, Missouri.

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PARACHUTES: Approved type. Seat, back, lap and chest; bought and sold; exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Brothers Balloon & Parachute Co., Aurora, Ill. Established 1903.

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WANTED: Salesmen to sell new Approved wood propellers along with other line of aircraft goods. State territory covered and reference. AERO DIGEST, Box 1646.

WANTED: Mechanics or pilots to act as our representatives in your own vicinity. Good commission. We do the selling. Government Approved Repair Station. Established 1924. Sweerbrock Aviation Co., Fort Wayne, Indiana.

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Airplane Mechanics Rigging Handbook

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This book shows you how to get an airplane into safe flying condition and how to keep it that way. It is written in plain, understandable language, without mathematics. Instructions are given in great detail, explaining how each operation should be done, in what order, and the reasons why. Just as useful are the many don'ts warning the rigger not to do the wrong thing. The book deals fully with handling planes on the ground and in the shop; how to true up the assembled ship; how to adjust wings and control surfaces for "hands off" flying; inspection; fabric; wood and glue; metal parts; wire; dopes and coping; folding and packing parachutes; installing and correcting compasses; repairing spars and struts; etc.

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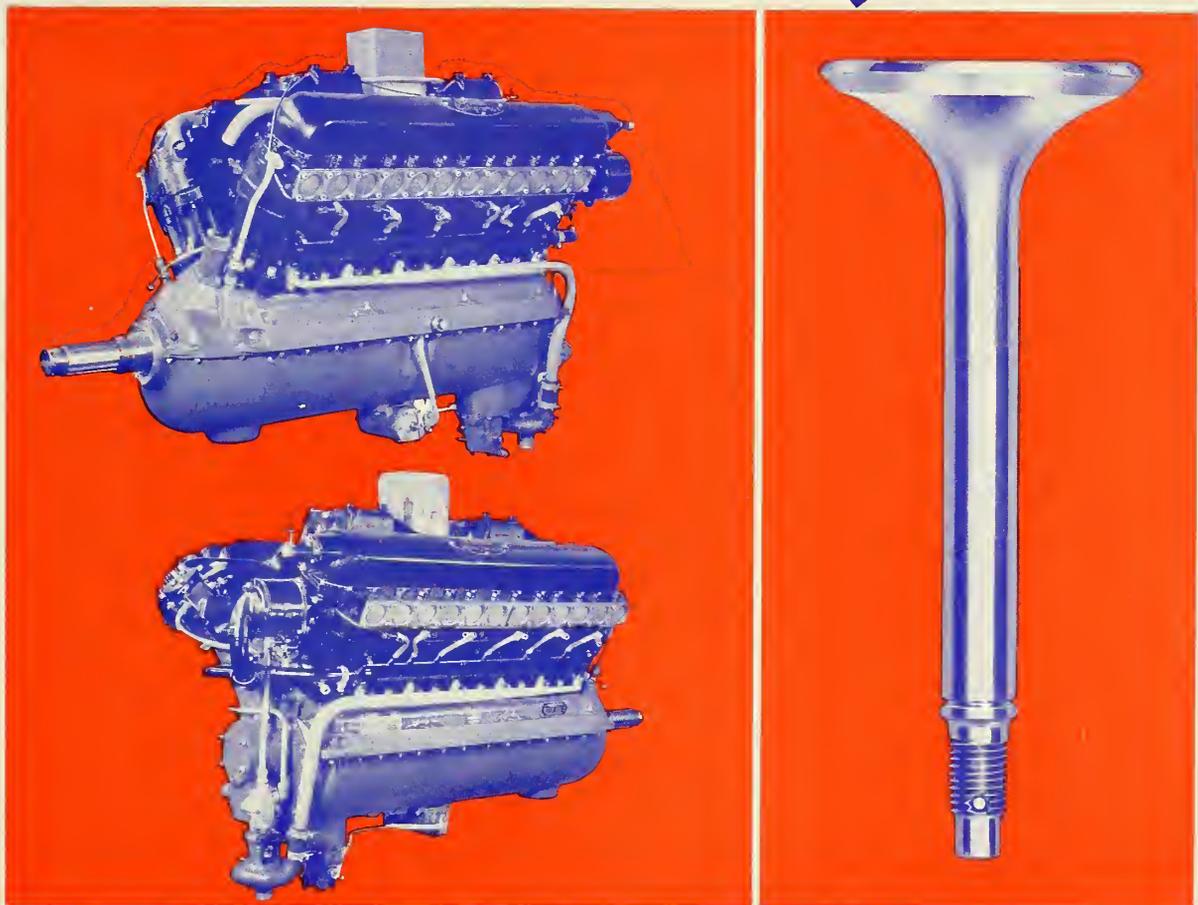
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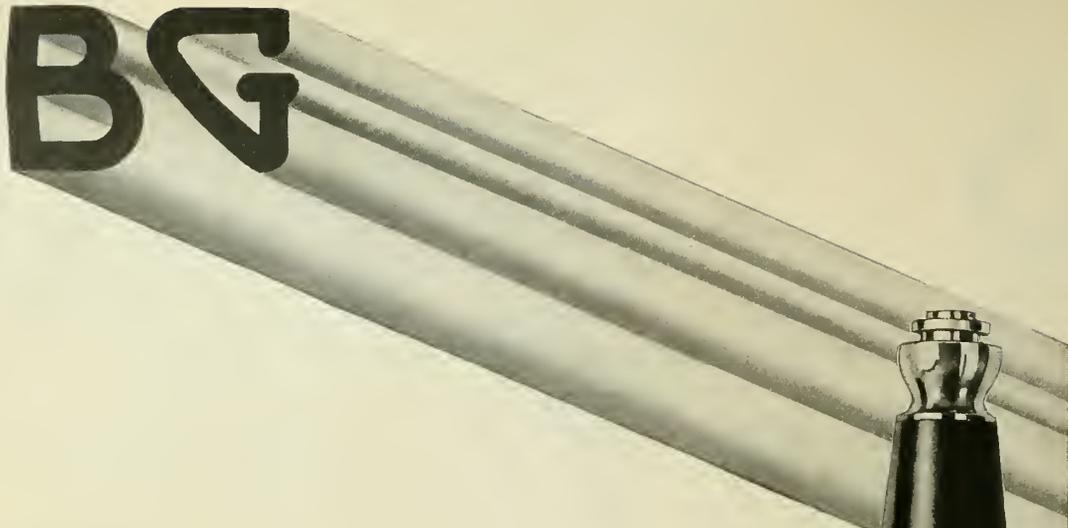
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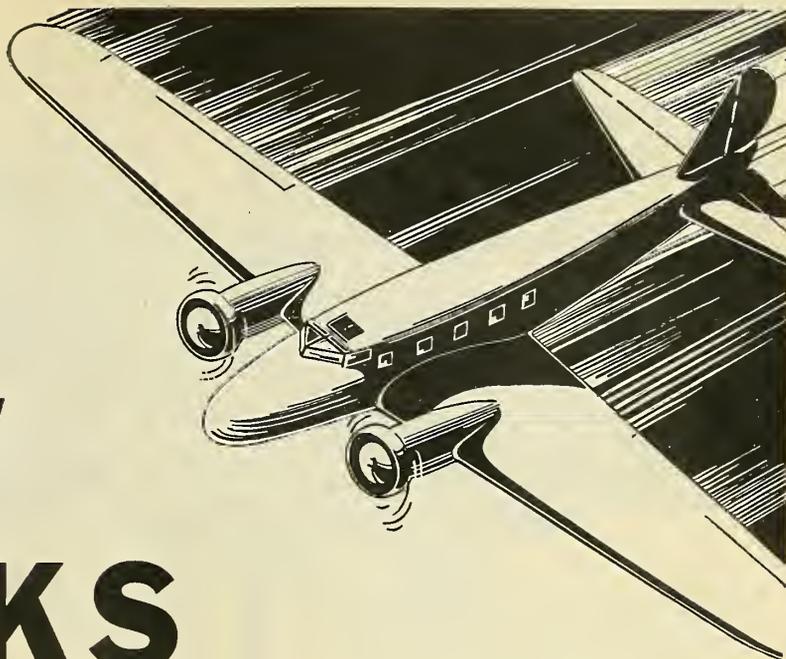
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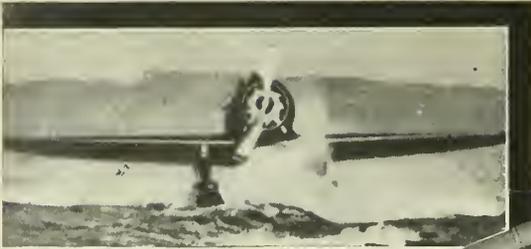
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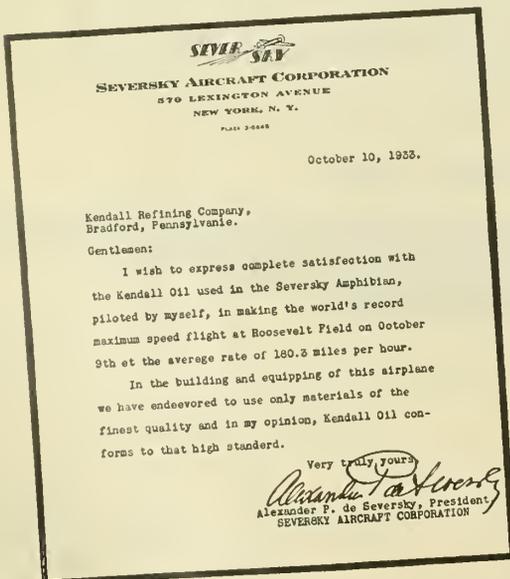


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Robert Dudley Smith

Giros versus Kite Balloons

for Military Observation



MAJ. GEN.
JAMES E. FECHET
U. S. A. (Ret.)

Three types of modern rotary wing aircraft in flight—The Wilford Gyroplane, Kellett and Pitcairn Autogiros

● Winning or losing a war usually depends upon the ability of a country to keep money and supplies flowing into its armed forces, and rarely is the population of a country so reduced that its supply of men, except the specially skilled types such as pilots and observers, is a determining factor. Therefore, it is most essential that every detail of military equipment be used with maximum economy.

Artillery observation during the World War was carried on by the use of captive or "kite" balloons. A great number of these were destroyed by the enemy and many observers who jumped with parachutes from burning balloons or to escape from approaching enemy planes were shot on their way down. As more practical aircraft have been developed since the World War, it is doubtful if the captive balloon will be of practical use for artillery observation in the future.

Its vulnerability, immobility, high cost, the large number of men, and the amount of supplies required to keep it in operation, places the balloon at a decided disadvantage. In view of this, let us consider the desirability of replacing this necessary field of observation with aircraft of the rotary wing type.

The following brief treatise deals with the possibilities of giros for a purpose for which kite balloons and non-rigid airships or "blimps" were used in the past.

The provisioning and transporting of supplies is a difficult task and is intimately linked with the number of personnel required to handle each aircraft.

Maintenance and operation of a single observation balloon in the air requires the services of a company, consisting of eight

officers and 170 enlisted men, and it is necessary that a spare balloon be kept on the ground so that repairs or replacement can be made without delay. Based upon similar practice, a company of men could maintain at least ten of the old type military aircraft of the heavier-than-air type.

Maintenance Problems

With the modern highly mobile balloon winches available today, the handling of the captive balloon has been greatly improved, yet under active service conditions it still would require at least 75 men to bed it down, repair shot holes, handle the many heavy cylinders of hydrogen or helium, and keep the spare balloon ready for use. The handling of rotary wing aircraft would require no more men per ship than an ordinary fixed wing airplane, and it should not require more than 15 men on the ground for each giro in the air. The amount of material required per day for the personnel and supplies for the giro would be reduced in about the same proportion. Therefore, under active fighting conditions, to maintain the giro would require only 20 per cent of the personnel and 20 per cent of the cost per day. This saving would be in addition to the elimination of the tremendous expense of supplying helium which is essential for any operation of balloons in warfare. Also, the giros would be able to transport themselves, leaving only the ground equipment to be moved on the surface, while the balloon and all its heavy equipment must be moved by surface transportation.

The initial cost of the balloon and the giro would probably be equal. However,

the balloon being much more vulnerable to attack, will therefore require more frequent replacement. The balloon's comparative visibility to an enemy is greater, since the average distance from which the giro can be seen in clear weather is about five miles, while the kite balloon, with its length of more than 80 feet and diameter of 25 feet, can be seen from a distance of 20 miles. The only defense for the balloon is to haul it down (a slow process at best) and provide anti-aircraft guns or airplanes (or both) to protect it, thereby withdrawing these units from other duties. On the other hand, an armed giro could either fly away or defend itself, since its maneuverability and short turning radius makes it a formidable opponent for attack by enemy aircraft.

More important than replacement of equipment is the replacement of experienced observers because of the time and money involved in training them. The more vulnerable the observation post, the greater mortality to be expected of observers.

The method of communication would be the same for both types of equipment—that is, telephone. One may jump to the conclusion that this would be a problem for the giro because of the weight and drag of the wire necessary for communication. However, simple calculations show that a 3,000-foot cable, 5/64 inch in diameter, will carry 550 pounds and weigh only 25 pounds. Therefore, it should be possible to mount within the giro a complete system with a cable no greater than 1/8 inch in diameter and weighing no more than 50 pounds plus a

(Continued on page 24)

They Should Do Something About It

SIXTH AND CONCLUDING ARTICLE OF THE SERIES ON AIRCRAFT MARKETING

CHARLES J. CUTAJAR

● An almost perfect formula for *not* getting anything done is to take the stand that "they" should do something about it. Whether the matter be of grave concern such as, for instance, a serious crime wave, or just a pleasant little problem about the condition of the seventh green, the chances are that "they" will be a long time doing anything about it. The reason loses its mystery when we substitute the other word for "they" which is "we". If we can as readily bring ourselves to alter our relationship toward the problem in question it would be easier to have "something" done about almost anything.

In the present discussion "they" (or "we") represent the aircraft industry and particularly that section concerned with the marketing of airplanes for individual ownership. Like all American industries, the aircraft industry is a democratic institution and suffers from the usual ailments of democracy. Particularly is it afflicted with the inertia inherent in all loosely united groups when it comes to a need for concerted action on any given problem. This disinclination is all the more pronounced when it comes to sales matters in which there is a natural conflict of selfish interests.

There is hope, however, in the general trend toward closer cooperation and self-regulation in industry, which first assumed definite form in the early years of the industrial "czars" and in the organization of cooperative marketing projects. This movement has gained added impetus under the codes of the NRA and it is highly probable that the aeronautical industry, with its revitalized Chamber of Commerce, will coordinate its activities to a greater degree in the future than at any time in the past.

Cooperative Sales Promotion Needed

If closer cooperation between the manufacturers is to take place, there seems to be no sound reason why any constructive program for betterment should not include a mutual effort to break down sales resistance and to create broader markets for airplanes. Indeed, it would seem that such an effort would benefit the industry as much as any other group

undertaking, since a healthy sales growth in any business usually provides the means of advancement in other respects.

There is ample precedent for cooperative selling endeavor by entire industries. Tea, coffee, fruits, berries, game, fish, flowers, cotton, cotton seed products, linen, silk, rayon, eyeglasses, coal, ice, lumber, metal, leather, plate glass, electricity, gas, laundries, cleaning and dyeing, fire insurance, public welfare and many other services and products of mine, farm and factory have been "sold" to the public through campaigns of promotion launched in behalf of the industries concerned. Some of these attempts have foundered on the rocks of business politics or have been halted or suspended for various other reasons. But a sufficient number of them have splendidly accomplished their purposes of expanding the market for their products, creating a more stable demand, enhancing the prestige of the industry and of those engaged in it and of gaining other practical advantages sufficient to justify both the idea of cooperative promotion and the methods of execution employed.

Aviation has not been without a group spirit despite the presence of a maverick or two on the range. Without that spirit it would not have been able to hold its many shows and meets, which, whatever may be said against them, have indisputably been the chief means of keeping flying before the public. With sales perking up and with a more hopeful prospect in view than at any time during the past four years, it may not then be amiss to inquire at this time what might be accomplished by an inclusive scheme of sales promotion to supplement the selling activities of the individual manufacturers.

In exploring the subject it is not the purpose of this article to argue that the conduct of such an undertaking properly belongs to any existing committee or association or whether some newly organized Sales Institute, possibly sponsored by the Chamber, might be the more effective agency. It is sufficient for the purpose to propose that some agency for the advancement of aircraft sales be brought into being under whatever auspices, and

then to examine its possible usefulness in the light of projected undertakings.

Assuming then, the existence of such a body in which all aircraft manufacturers would be represented, having the power and the means to put into operation general activities to promote the sale of aircraft, to what specific problems would such a group give its attention and what means would it employ to accomplish the desired ends?

The Chief Causes of Sales Resistance

We do not have to seek far for the problems. They have been with us a long while and are wearily familiar to all who have tried a hand at selling airplanes. It might be argued that product drawbacks form the greatest sales barrier, the airplane for individual ownership being still a pretty elementary machine, improvements having been evolutionary rather than revolutionary and the most striking advancements having been made in the transport field. But our job is to sell what is given us to sell, and it is not for us to seek an alibi by referring the whole matter back to the drafting room and the testing laboratory. The problems bearing on the marketing side of the aircraft industry which should be given attention are, chiefly, these:

High Cost—The average plane for private ownership is still beyond the reach of the majority of people and of those who might buy, many are deterred by the lack of time payment facilities, prohibitive charges for insurance coverage and the high cost of maintenance and upkeep.

Nuisance Factors—Many owners who have no more than the usual leisure time, become unsold on plane ownership by the exactions demanded of them in connection with their planes, the necessity for frequent practice to maintain proficiency in flying, the time required to reach the airport from their homes, the nuisances of physical examinations, plane inspections, licensing, etc. These last mentioned may soon be alleviated by action of the Department of Commerce.

General Public Attitude—There is a tremendous public interest in flying, but

(Continued on page 59)

AIR

Hot and Otherwise

FRANK A. TICHENOR

A Questionable Questionnaire

● There are more ways than one to let light into a dark room. The window shade may be raised or one may lift off the roof. Few announcements coming from official Washington concerning aeronautics have caused so much comment and brought such varied reactions as that made by the Aeronautics Branch last month of "a plan for widespread development of private flying through volume production of ten thousand \$700 airplanes." Listening to the reverberations around the airports, and in other air centers, of that effort by Mr. Vidal to bring some sign of new activity into the light airplane market, one is led to believe that he has inadvertently employed the roof-raising method.

Undoubtedly Mr. Vidal's intentions are of the best. However, lest some serious damage may be done, it would be worth while to ascertain a few of the causes and effects of Mr. Vidal's hope-inspiring questionnaire.

Mr. Vidal's attempt to stir up interest (and some cash activity) in the light plane field has not turned out to be entirely the happy gesture he intended. It is too visionary to go down easily with an industry pretty hard bitten by realism since the halcyon days of '29 when everybody was going to have an airplane—tomorrow. It was unfortunate that one of the first important announcements to come from Mr. Vidal's department should be so lacking in realism.

Four or five years ago such a proposal might have been accepted at even more than its face value. But not today. The original announcement of the plan set a "minimum production by the American aircraft industry of 10,000 small airplanes by next spring," and definitely left the impression that an entirely new type of ship was to be evolved and marketed. Such a ship, even if it was already designed and built, in order to be ready for quantity production, would require longer than the coming of spring to work out the "bugs" that every new type of airplane reasonably can be expected to have.

If the 10,000 planes are to be identical (as they must be in order to conform to the mass production idea) who is to build them? If many manufacturers are to participate in the production, will not the lessened quantity to be built by each mean lessened individual production and correspondingly higher costs. If one manufacturer can build 10,000 of the \$700 planes at a profit, does it follow that 10 manufacturers can make a profit

by producing 1,000 planes at the same selling price?

Where is our reliable low-priced aviation engine to come from? Automobile engines have not been particularly successful in aircraft in the past. And what about expenses of distribution, etc. The costs of these items subtracted from the \$700 mean that actual production cost of each unit would have to come nearer to \$400.

It did not seem neither a practical nor a realistic statement to the men on airports, or to the men who have been working (shall we say in the dust?) for a long time to get some of the 14,000 licensed pilots and 11,000 student pilots into closer contact with some of the existing and proven light types of airplane.

Idea Seems Impracticable

To the man interested in the general field of aeronautics, Mr. Vidal's desire to get the private flier and the private plane together in what in the good old days might have been referred to as a cash transaction, seemed in a way highly commendable, but again not very practical. It certainly did not impress him as the most important assistance which the government might give to commercial aeronautics at this time.

There is no reason why the private flier should disappear beneath the wave of successful commercialized flying—nor will be. But if mass production of light airplanes as a self-sustaining industry could not be fully put over under the high pressure of prosperity and of a plentiful supply of dollars, it certainly seems unlikely in the fifth winter of the depression to be put over by a questionnaire. The light plane idea is not new; it has been experimented with many times previously (and unprofitably) on a scale comparatively large enough to test the market's reaction. It appears that what

we have here is simply another suggestion which puts the cart before the horse; that is, the creation of a product requiring for its success mass production before proof of efficiency and acceptance by the pilots who are expected to fly them.

It is no secret that the hard-working and hard-pressed Aeronautics Branch has been under pressure for some time to do for private flying something big, spectacular, and constructive. But it was indeed regrettable that Mr. Vidal's questionnaire, which he must know caused a veritable storm upon many airports, left the erroneous impression that the Aeronautics Branch had a specific and definite plane design in view when it presented its proposal to American fliers. The questionnaire authors were too definite in describing details of the type of plane they had in mind.

In our criticism (not so much of the project itself as of its presentation) we have been insisting upon a more realistic view of actual conditions. Too much emphasis has been placed upon the hopeful, "just imagine" attitude of officials now in charge of the federal aeronautics policy. It reminds us of the old story of two Knights of the Road who were talking things over while riding in an empty freight car. The first one exclaimed "Oh, boy, just imagine—a thick sirloin steak, fried sweet potatoes, bread, coffee and a great big piece of pie—all for fifteen cents!" "Yeah! Where can you get it?" asked his companion. The reply was—"I don't know, but just *imagine* it!"

The Aeronautics Branch has been receiving many encouraging replies to its questionnaire. We are not surprised that there are many private pilots who would like such a ship at \$700. According to the figures of Miss Frances Perkin's Labor Department there are some 10,000,000 people in this country who would like just such a fifteen-cent dinner as described above; but not only does such a dinner appear non-existent, but often the necessary nickel and dime also is conspicuously absent.

We commend the Aeronautics Branch for its efforts in attempting to bring the light airplane manufacturer in touch with a current market, but let no one who is at present in the market for any of the excellent low-priced airplanes now available hesitate in making his purchase because of the Department's questionnaire. The prospect of an early fulfillment of the \$700 airplane idea is too remote to let it be the means of curtailing the sales of tried and proven aircraft.

E D I T O R I A L S

"We who have known the disappointment of preparation for a flight to the stratosphere over a period of many months, and the labor that went into the calculation of the details of it, and finally the work of the flight itself, are pleased to find ourselves greeted as scientists who tried to do an honest job despite innumerable adversities."

—LIEUT. COMDR. T. G. W. SETTLE, U. S. N.

2000 Additional Airports

• A plan of far-reaching significance has just been formulated by the Aeronautics Branch. The Department is to be warmly congratulated and heartily encouraged in its intention to establish at least 2,000 aircraft landing fields on municipally-provided ground in as many cities and towns throughout the United States. Beside supplying employment for at least 50,000 persons, the project will make it possible for many cities, now financially embarrassed, to build for themselves airport projects which they otherwise would be unable to do without the assistance of federal funds.

With the construction of these airports and their availability to aerial traffic, it is not unlikely that an additional stimulus will be provided for commercial and private flying in those cities which will be quick to take advantage of the Department's offer. The task will eventually provide an outlet for thousands of dollars worth of lighting facilities, hangar and fencing material and the other necessary adjuncts that even the most meagre landing field requires, providing a great boon and tremendous benefit to the manufacturers of airport equipment, now long idle.

The landing field project is just another step by the new Administration to stimulate private flying in this country. Other nations have not been lax in encouraging this branch of aeronautics by lending every possible aid. It is encouraging to find the Government through the Aeronautics Branch making this investment in a relatively new industry and including it as part of the recovery program of the entire country.

Unlike some of the other Federal projects to alleviate unemployment, this plan will make possible the establishment of permanent utilities which in later years will, in all probability, repay the government and the localities in which they were established, many times over.

New York's Flying Mayor

• Fortunately for New York City, as well as the aviation world, New York's Mayor-elect Fiorello H. LaGuardia is a flying man as well as a patriot. Immediately upon being elected to the city's highest office he embarked upon a vacation trip to Panama. His return journey

included flights, as a regular passenger, over Pan American Airways between Cristobal, Canal Zone and Miami, Florida; continuing on north via Eastern Air Transport to New York, a total of over 2,500 miles by air.

The Mayor-elect not only patronizes extensively the established airlines, but he is also a pilot, a Major in the Air Corps and saw real service on the Italian front during the war.

Confidence in the most modern mode of transportation is but another indication of this aggressive man's desire for speed and direct action. The people of New York can look forward to real accomplishments where he is concerned. His understanding of aeronautical problems while reflecting to the benefit of the municipality which elected him, cannot fail to favorably impress the people in other communities as well.

Unlike many high officials who talk about aviation without taking an active part in it, he has for years participated in aeronautical activities upon every occasion. As Mayor of New York he will lead the way in proving the efficacy of aviation as it relates to the problems of a big city.

Recognition of Russia

• As for many other American industries, the recognition of Russia should mean a new flood of business for American aeronautics. In fact, before the negotiations between President Roosevelt and Commissar Litvinoff had reached the final stages of discussion, arrangements had been successfully concluded for the manufacture, on a large scale, of American aircraft equipment in Russia.

During celebration of this new market's development it is fitting to recall the part which aviation had in restoring and encouraging friendly relations between the two countries. Many words of doubtful value were spoken and written in the recent past to label "foolhardy" flights as being undertaken for the sole purpose of creating international good will. In the case of flights between this country and Russia such claims were not justified. The courteous and helpful treatment which Post, Lindbergh, Matern and other American flyers received in Russia had a reassuring effect upon the American people as a whole. The enthusiasm which Americans displayed toward the flight made by the Russian

airplane "*Land of the Soviets*" a few years ago was also helpful in hastening the day of recognition.

Any contretemps which might have developed in connection with these flights might well have been responsible for an indefinite delay in the restoration of relationship between these two great nations.

On Guard with Aviation!

• At this time we welcome a recruit to the home guard of our national air defense. We have been waiting for a long time for him to join up. In our own enthusiastic conviction that there was ever present the necessity for urging the maintenance of our air arm strength, we frequently were certain that the draft officer would catch the editor of *Aviation*, still lingering at home. But this hasn't happened. We report exactly what the Professor said to the recruiting officer when he finally joined up.

In last month's *Aviation* the following appears:

(The italics are ours. Ed.)

"This is to be an editorial that we have often been urged to write during the past five years. We have held back, and held back, so long as there seemed reason for doubt or for difference of opinion. (*The old fighting spirit of Greeley and Pulitzer!*) . . . We hope that our determined abstention will be remembered both within the industry and by our friends outside its ranks to whom we are addressing this editorial, when we say that the time has come when we can be silent no longer. (*The A. D. Trophy for Self-Restraint is now being dusted off.*) " . . . The attempt to organize the world for the preservation of peace has broken down in the Far East, and it is threatened with a test still more critical in Europe. Efforts to preserve peace will continue, and they will still deserve the widest possible support, but in the meantime we have reached a point where we must consider our own safety in a world of tooth and claw."

The entire confession has some excellent points, but all of them would be largely repetitious to our readers. *AERO DIGEST's* editorial support of National Defense has been outstanding for many years, devoting considerable attention to the subject long before the idea became so popular as to convert *Aviation* to a change of heart.

An Australian Tea Party

●
CY CALDWELL

● American Aviation should devote some deep thought to the business of building up a much larger export trade for American airplanes and engines. It is high time that American Aviation started out to get itself some customers who still use money with a somewhat smaller gutta percha content than ours, even if they too are off the gold standard.

The best possible advertisement for American Aviation would be for American airplanes and engines to win the MacRobertson International Trophy Race from England to Australia, to start October 20, 1934. Briefly, the race is international, open to any individual, organization, or nation; any type of plane, and engines of any horsepower. There is a speed race and a handicap race. Speed race prizes are: first, £10,000 and a gold cup valued at £500; second £1,500; third, £500. Handicap race prizes are: first, £2,000; second, £1,000. The £ is now worth \$5.50. The speed race is for the fastest time; handicaps for the handicap event will be on a formula of efficiency, commercial utility, speed. The entry fee is £50 for the speed, £10 for the handicap, which will be refunded if the machine reaches the first control point, Baghdad. Other control points are Calcutta, Singapore, Darwin, and Charleville. The speed will be calculated from control to control point, with no time allowance for stops between those points. Full particulars and entry forms are available from the Secretary of the Royal Aero Club, 119 Piccadilly, London, W. I.

Right Up America's Alley

There is nothing to prevent American airplanes winning all three places in the speed race. About the handicap race, it will depend upon the formula, and how it favors one type of plane above another; what percentage is allotted to speed, to weight carrying, to characteristics of safety, landing speed, comfort of passengers. That factor of "commercial utility" can take a wide variety of meanings, according to the use to which the airplane is to be put. Under one formula a Boeing transport might win; under another formula the Puss Moth might win.

Certainly one should ascertain the details of that formula before entering that division. But in the speed race, with a first prize of over \$50,000, an American airplane should win, barring bad luck. American planes should win all three places, unless the English or the Europeans build faster special planes, for they have, so far as I know, nothing today that could beat us.

We've been hearing so much about England and Italy racing Schneider cup seaplane entries at over 400 m.p.h. that we almost forget that they have no fast commercial planes. And those excellent racers are good only for a short race; they couldn't fly to Australia. Our modern transport planes could throttle down and pass the fastest English transport flying full out. In fact, most of them are such slow arks that if Father Noah came back and stepped aboard them he'd be looking around for his animals.

The Handley-Page 42.W cruises at 105 m.p.h., the A-W Atalanta Mk I. cruises at 130. The Vickers Viatra cruises at 160 m.p.h. The Boulton and Paul mail-carrier is England's fastest commercial plane with 172 m.p.h. cruising speed and a range of 1,250 miles. Even that one would need a tow from an American transport to keep up with many of the planes we are shuttling back and forth across the continent every day in the

year. The rest of the English commercial craft cruise at from 118 down to as low as 100 m.p.h.

However, that doesn't mean that if the English or the French or the Italians set their minds on winning this great international race they couldn't turn out some very fast planes, for they could. They've had valuable experience in building racers; and I'm amazed that they apparently haven't benefited by that experience in the design of their commercial craft, which remain, so far as speed is concerned, what we would call tubbish old crates, a mess of wires, struts, hanging undercarriages, engines hung onto wings anyhow, and numerous blobs and gadgets sticking out everywhere into the airflow. As for racing craft like the Wedell-Williams and the Gee Bee, the English have none whatever.

Record Holders Without Speed Planes

In short, what it all boils down to is this: Despite the fact that Great Britain held the world's speed record for some time and won the Schneider trophy outright, when a long distance speed race is to be held for a large cash prize, she suddenly discovers that she has not one aeroplane capable of entering with any hope of success. We Americans should take full advantage of that amusing condition because for some years now we have been listening good-naturedly to my good friend Mr. C. G. Grey of *The Aeroplane* declaim that English aeroplanes are the best in the world, bar none!

Mr. Grey is a power to be reckoned with by American Export Aviation. For years he has been expounding his opinion that English aeroplanes are the fastest, the strongest, the most efficient, the most desirable in the universe. Probably Mr. Grey believes these statements to be true; for he has such a convincing way of writing that I imagine he has convinced himself of their truth. He has done more than has any other man to bolster England's aeronautical prestige in foreign markets. As an aviation paper editor he has done a splendid job, and England should be delighted with him. If any



"He writes while standing on his head"

(Continued on page 56)

AVIATION ENGINEERING

TECHNICAL EDITORS: GLENN D. ANGLE • PROF. ALEXANDER KLEMIN • DR. MAX MUNK • DR. MICHAEL WATTER

The Maximum Lift Coefficient

PART ONE: ELEMENTARY THEORETICAL CONSIDERATIONS

ALEXANDER KLEMIN

Daniel Guggenheim School of Aeronautics, New York University

Boundary Layer Thickness

● At the immediate surface of a body, both theory and experiment indicate that the moving fluid (air or liquid) adheres to the surface of the body. Within a narrow layer next to the body (termed the boundary layer), the velocity rises from zero at the surface to its full value in the general stream.

The velocity gradient between two closely placed lines of flow, is the ratio of the velocity difference to the distance between the lines, or dV/dn as in figure 1. The viscous force per unit area between two such lines of flow is $\mu dV/dn$ where μ is the coefficient of viscosity. Since the boundary layer is very thin, and the velocity rises from zero to a finite value in a short distance, the velocity gradients and hence the viscous forces are large within the layer. Elsewhere in the fluid, the velocity gradients are small. The viscous forces may be neglected, and the fluid considered as a perfect fluid without viscosity.

The simplest case of a boundary layer is that of a thin flat plate, placed parallel to the air stream; if the flat plate is thin enough, the main character of the flow is undisturbed by its presence, and there is no pressure gradient in the main flow. When the fluid first touches the thin plate, there is present a very large velocity gradient, and a large viscous drag is set up. Therefore, the streamline near the plate is slowed down and thickened. This thickened and retarded streamline in turn retards the adjacent line a little further from the plate, and so on. The boundary layer starting at zero at the

In Part I the author gives a simplified theory of the effects of scale and turbulence on the value of the maximum lift coefficient, and ventures some tentative original hypotheses relating such effects to the airfoil profile. In Part 2, a study of experimental data will be made to facilitate the evaluation of full scale maximum lift coefficients from wind tunnel tests.

edge of the plate gradually thickens. The outline of the boundary layer and the character of the flow are approximately represented in figure 2.

The lines of flow within the boundary layer are not parallel to the plate but curve outward slightly. This curvature of the lines is very small, however, and the component of velocity normal to the plate is therefore negligible. If the component of velocity normal to the plate is negligibly small, then the pressure gradient normal to the plate is negligibly small also. Hence the pressure at any section AA of the boundary layer is that of the fluid external to the boundary layer at this point. The pressure change in the direction x within the boundary layer is therefore dependent on the pressure gradient outside the boundary layer.

It is possible for the case of the thin plate, without external pressure gradient, to find very readily on what factors the thickness of the boundary layer depends.

Let us imagine that for a distance x from the leading edge, the mean thickness of the boundary layer is δ , so that the mean velocity gradient is roughly

proportional to U/δ , where U is the velocity in the undisturbed stream. The velocity gradient at the surface of the plate will be roughly proportional to U/δ . Let the breadth of the plate be b , so that the wetted surface on one side up to the point x , is xb . The mass of air which is retarded within the boundary layer will be proportional to $(\rho \cdot b \cdot \delta U)$ in unit time, where ρ is the density of the air. The deceleration which it experiences must be proportional to U . Hence the change of momentum in unit time is proportional to $(\rho \cdot b \cdot \delta U) U$ or $\rho b \delta U^2$. The change of momentum in unit time is proportional to the viscous drag of one side of the plate, which is dependent on the wetted area, the coefficient of viscosity and the velocity gradient. In other words, the viscous drag is proportional to $b \cdot x \cdot \mu \cdot U/\delta$.

$$\text{Hence } \rho b \delta U^2 \propto b x \mu \frac{U}{\delta}$$

$$\text{So that } \delta^2 \propto \frac{\mu \cdot x}{\rho U}$$

$$\text{and } \delta \propto \frac{(\mu x)^{1/2}}{(\rho U)}$$

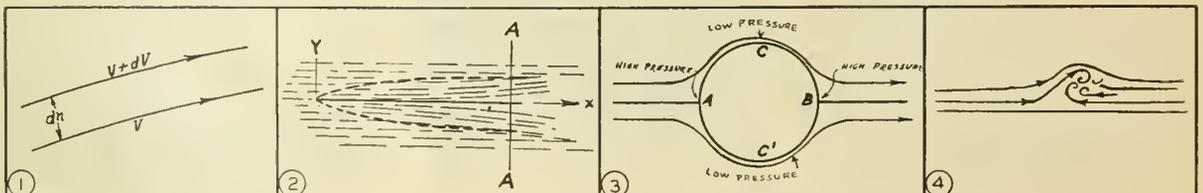
This is not unreasonable since

1—The greater the length of the plate, the more opportunity there is for the thickening of the boundary layer.

2—The greater the viscosity, the greater the layer of fluid affected.

3—The greater the density, the thinner the layer of air affected.

4—The momentum reaction increases as δU^2 , while the viscous drag increases



as U/δ , so that it is clear that δ must decrease as U increases.

Tearing Away of Boundary Layer

In the case of the thin plate there is, as stated previously, no pressure gradient in the x direction. If the flow round a cylinder is studied, then as in figure 3, there is a region of high pressure at the point A, where the fluid comes to rest, a region of high pressure at the point B, where the fluid is again at rest. At C and C' the fluid will be moving more rapidly than in the undisturbed stream, and C and C' will therefore be points of high velocity and low pressure. From A to C or A to C', the fluid is therefore moving in a negative pressure gradient and is being accelerated. From C or C' to B the fluid is moving against a positive pressure gradient and is therefore decelerated. In such a case the boundary layer will thicken much more rapidly than when there is no gradient.

Now let us consider a layer of fluid quite close to the surface. This layer will be pulled forward by the adjacent layer (a little further from the surface) and will be retarded by the adverse pressure gradient. As the boundary layer thickens rapidly and the velocity gradient near the surface decreases, the pull forward of the adjacent layer diminishes, while the pressure gradient remains adverse. In such a case the layer may lose its entire velocity, and even flow backwards along the surface, as in figure 4, with a separation layer, leading to the formation of eddies or vortices. For an airfoil there is, just as for the cylinder, a region of maximum suction, and subsequently an adverse pressure gradient.

Laminar and Turbulent Flow

The flow in the boundary layer considered thus far has been laminar or smooth. Under certain conditions it can become turbulent, when the general character of the flow is not vastly unchanged, but oscillations of velocity to and fro are super-imposed. The presence of turbulence in a pipe is indicated by the simple experiment of figure 5. If a jet of colored fluid is introduced into a pipe where the flow is smooth and laminar, the main bulk of the fluid remains uncolored. If the velocity of the flow is

greatly increased, it becomes turbulent and the entire pipe is colored. The transition depends on the value Ud/v where U is the velocity, d the diameter of the pipe and v is the coefficient of kinematic viscosity $= \mu/\rho$.

The same effect may occur in the boundary layer where the thickness δ is now equivalent to the diameter of the pipe. The flow may be laminar for a certain distance along the pipe, and when a certain boundary layer Reynolds' Number $U\delta/v$ is attained, a transition point occurs where the flow changes from laminar to turbulent. The critical value of $U\delta/v$ is evidently decreased when the flow ahead of the plate is itself turbulent.

For a flow without adverse pressure gradient, we have seen that

$$\delta \propto \frac{(vx)^{\frac{1}{2}}}{(U)}$$

The boundary layer Reynolds' Number $U\delta/v$ is therefore

$$\begin{aligned} & \frac{U(vx)^{\frac{1}{2}}}{v} \\ & \propto \frac{U}{v} \left(\frac{Ux}{v} \right)^{\frac{1}{2}} \end{aligned}$$

In a flow of a given external turbulence, the value of the critical transition point will therefore be at a shorter distance from the leading edge as the velocity of flow increases and as v decreases. If the turbulence increases the critical or transition number will decrease in magnitude, and the transition point will also occur earlier.

Separation by Turbulence

If two layers of air are flowing side by side there is also an interchange of molecules between them. The faster moving layer loses momentum, the slower moving layer gains momentum. Viscosity is therefore substantially an interchange of momentum.

When the motion is turbulent the interchange of molecules and of momentum is more rapid. Turbulence is therefore equivalent to an increase in viscosity.

Now let us assume that in the flow past a surface against a positive pressure gradient, the transition point from laminar to turbulent flow occurs before the inner layers are brought to rest and separation occurs. Thereafter the inter-

action between adjacent layers will be more powerful and the outer layer will act more effectively in keeping the inner layers in motion against the action of the positive pressure gradient. In other words, the onset of turbulence will delay separation or tearing away of the boundary layer.

It should be noted that whether turbulence in the boundary layer is produced by increased speed, or Reynolds' Number, or by turbulence in the general airstream, the effects on the position of the transition point and on delay of separation will be similar.

Measure of Turbulence

The elementary theory of tearing away of the boundary layer can be readily applied in the consideration of sphere drag, and conversely, the drag of spheres can be used as a measure of the turbulence in an airstream.

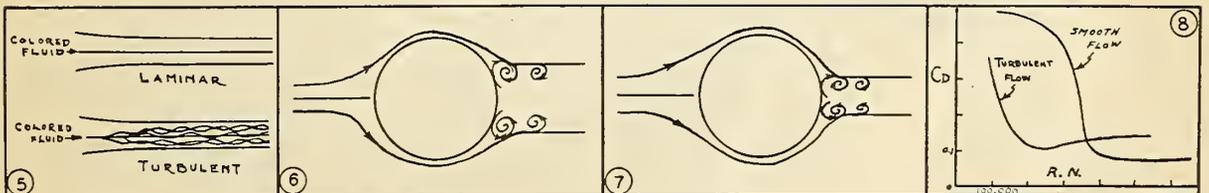
When air flows past a sphere, it follows smoothly past the forward surface, with the boundary layer gradually thickening. When once the point of maximum suction is past, the flow works against a positive pressure gradient. The boundary layer then thickens more rapidly and the layer very close to the surface of the sphere is retarded more powerfully. Finally it is brought to rest, and separation takes place with the formation of eddies or vortices, as illustrated in figure 6. The energy expended in the formation of such eddies is far greater than the energy expended in overcoming viscous drag at the surface of the sphere.

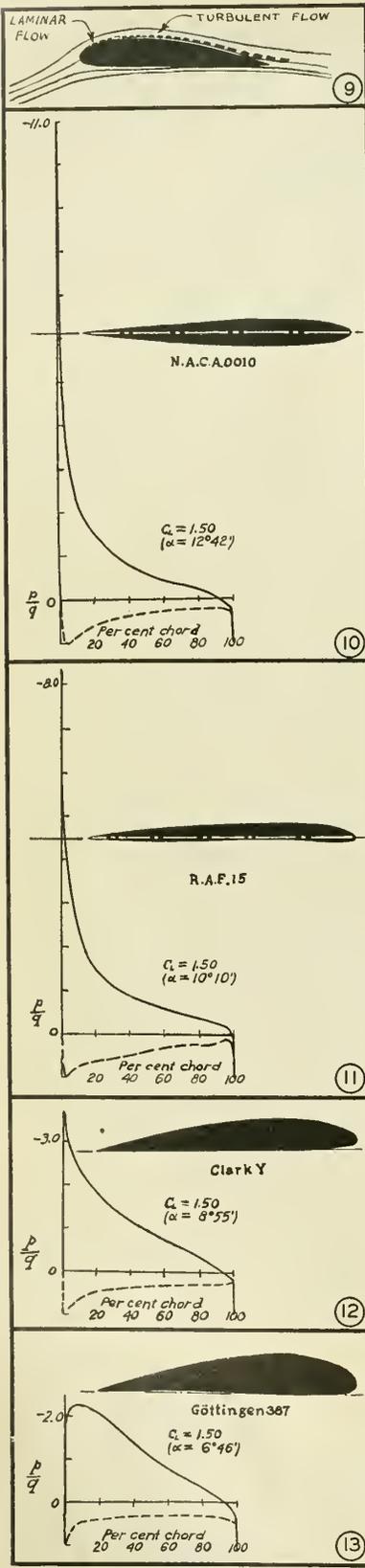
Now if the velocity past the sphere is increased, the critical value of the boundary layer Reynolds' Number will be reached at a lower value x , or peripheral distance from the stagnation point at the forward edge of the sphere. Hence turbulence in the boundary layer will occur earlier and the ultimate separation of the flow will be retarded. As indicated in figure 7, the area of eddy disturbance will thereby be diminished and the drag correspondingly decreased.

From the expression $\left(\frac{Ux}{v} \right)^{\frac{1}{2}}$ for the

boundary layer Reynolds' Number, it is clear that the transition point will also be made to occur earlier if v is diminished.

Again, if the diameter of the sphere is





increased, then for a given value of x measured along the circumference, the transition point will be advanced.

Separation for a sphere will therefore be delayed by:

1. Increase in U .
2. Increase in the diameter of the sphere.
3. Decrease in v .

In other words, increase in the Reynolds' Number will delay separation and decrease the drag coefficient.

Again an increase in the turbulence of the flow will decrease the critical value of $\left(\frac{Ux}{v}\right)^{1/2}$ and hence advance the separation point and decrease the drag.

That increase in turbulence and in the general Reynolds' Number will decrease the drag coefficient of the sphere is illustrated by the typical curves of figure 8.

It follows that if drag values for a sphere are obtained, they will, correctly interpreted, serve as a measure of the turbulence of the flow.

In flight it may be expected that the gain of the turbulence is so small with relation to the general flow paths of the air that free air may be considered to be non-turbulent.

The measure of sphere drag coefficients is particularly valuable in indicating the degree of turbulence for any particular wind tunnel.

The turbulence of a wind tunnel depends on such factors as the honeycomb or honeycombs employed, the care exercised in guiding the air round corners, the design of the exit cone, the length of return channels, the care taken to eliminate propeller swirl. It is a moot question whether a tunnel should have smooth or turbulent flow. The turbulence of a wind tunnel has, however, almost as much importance with regard to the maximum lift coefficient.

Maximum Lift Coefficient

The lift coefficient increases as the angle of incidence increases. At a given wind speed in the tunnel, increase of the lift coefficient means increasing pressure gradients. Hence, increase in lift coefficient is accompanied by a rapid thickening of the boundary layer in the region of adverse pressure gradients, and increasing retardation of the layers closely adjacent to the upper surface of the airfoil. Finally, as in the case of the sphere the flow is arrested, and separation takes place. The lift then ceases to increase with incidence, and finally "burbling" and loss of lift results.

The flow in the boundary layer is apt to be laminar for a part of the upper surface, and turbulent past the transition point. See figure 9.

Now if owing to increase in the speed of the test, or increase in the Reynolds'

Number, or increase in the general turbulence of the flow, the transition point is advanced towards the leading edge, so that a turbulent boundary layer is present over a larger part of the upper surface of the airfoil, the separation point will be delayed as in the case of the sphere.

The airfoil will therefore be able to work at a greater angle of incidence and a greater coefficient of lift before separation and burbling takes place.

This argument constitutes the fundamental hypothesis regarding the effects of scale and turbulence on the value of the maximum lift coefficient.

Some Additional Hypotheses

The above theory was first enunciated briefly by Dryden, and has been followed by able, thorough, and original work by Von Kármán, Millikan, Klein and Jacobs.

The theory does not, however, suffice to explain all the phenomena encountered, particularly as regards scale and turbulence effects on various types of airfoils. The apparently contradictory effects of scale and turbulence on various types of airfoils have been particularly puzzling to various writers on the subject.

We will venture some original hypotheses in explanation of these contradictory effects.

Tests at Low Scale Values

In tests at very low scale values, and varying scale, it may be found that increasing LV actually involves decrease in the maximum C_L coefficient.

If the tests are made under conditions of low general turbulence, then it is probable that the transition point from laminar to turbulent flow is never attained.

Increasing the speed of test under such circumstances, increases the pressure gradient (which is proportional to U^2). The viscous drag between adjacent layers only increases as U . Hence the retardation of the fluid in layers adjacent to the surface is more marked. The separation point moves further forward with increase in speed and hence the maximum lift coefficient decreases with larger Reynolds' Number in this particular case.

Thin, Symmetrical Airfoils

The theoretical pressure distribution for a thin, symmetrical airfoil, such as the N.A.C.A. 0010, at high angle of attack, is shown in figure 10.

The modern theory of the airfoil, widely accepted and concordant with experiment, states that a thin, symmetrical airfoil is equivalent in its lift action to a straight line. A straight line producing the maximum deviation at the leading edge, produces the greatest change in velocity at the leading edge, and a relatively enormous pressure gradient at the

(Continued on page 24)

Span, Power and Weight

Span as a fundamental factor in airplane design has probably been responsible for more failures and more successes than any other variable. It has received only a fraction of the consideration and study that has been expended on airfoil profiles, aspect ratio, and the like, although its effects are of far greater importance, and its influence the most basic of all the prime variables. It is closely allied with considerations of weight and power as indicated by the diminutive spans of the racing planes of great power and the extreme spans of the powerless sailplanes.

It is the purpose of this article to investigate the mathematical background of the proper relationship of span, power, and weight of the airplane, and to conduct an experimental verification of the results deduced.

Theoretical Criteria

According to the laws of similitude, the mass of an object varies as the cube of its linear dimensions. Mathematically expressed:

$$M \propto L^3 \text{ or } M = kL^3$$

Weight and mass are interconnected by the constant of gravitation so that $W = Mg$ and the above formula takes the form

$$W = k^1 L^3$$

Since the span of the airplane is its principal linear dimension, we may write

$$S = L \text{ and}$$

$$S = K \sqrt[3]{W}$$

Thus the span is proportional to the cube root of the weight; that is, if the weight is increased to eight times its initial value the span will have to be doubled if the similarity is to be preserved.

The discussion has not concerned itself with the aerodynamical features of the problem but merely to the basic physical relation that exists between the span and the weight. It remains for us to investigate the aerodynamical aspects of the problem.

The aerodynamical influence of the span is confined to the induced drag, that part of the airplane's resistance induced by deflecting the fluid stream to produce the lift necessary to sustain the machine in flight.

SCHUYLER KLEINHANS

The induced drag is given by the formula:

$$D_i = K \left(\frac{W}{S} \right)^2 \frac{1}{V^2} \text{ where}$$

- D_i = induced drag
- W = weight
- S = span
- V = velocity
- K = A constant depending on the units used and the type of distribution of the lift along the span.

It is seen immediately that if the induced drag and the weight remain constant that the span is inversely proportional to the speed, that is

$$S \propto \frac{1}{V}$$

Resistance to fluid motion can be shown to be proportional to the square of the speed. The horsepower required

will then be proportional to the cube of the speed

$$HP \propto V^3$$

The amount of power available will depend on the propeller efficiency and the brake horsepower of the engine or engines. For our purpose, the propeller efficiency may be assumed constant as small differences in propeller efficiency are negligible when compared to other factors involved. To allow for different weights and powers of airplanes, it is well to use not the actual power, but the so-called inverse power loading, i.e. the ratio of power to the weight

$$\frac{HP}{W}$$

Since the inverse power loading of the plane is a measure of its power and the power required is proportional to the cube of the speed, we have the power loading inversely proportional to the cube of the speed.

$$\frac{W}{HP} \propto \frac{1}{V^3} \text{ or } V \propto \sqrt[3]{\frac{HP}{W}}$$

Now since the span was inversely proportional to the speed we have the span inversely proportional to the cube root of the power loading, i.e.

$$S \propto \frac{1}{\sqrt[3]{\frac{HP}{W}}} \text{ or } S \propto \sqrt[3]{\frac{W}{HP}}$$

Thus with the original relation

$$S \propto \sqrt{W}$$

and the relation above

$$S \propto \sqrt[3]{\frac{W}{HP}}$$

we have both a means for choosing the proper span in terms of weight and a means for modifying it to suit the power available. Thus we see that the span when considered both physically and aerodynamically is proportional to the cube root of the weight and inversely proportional to the cube root of the power weight ratio; that is

$$S \propto \frac{\sqrt[3]{W}}{\sqrt[3]{\frac{HP}{W}}}$$

$$\text{or } S = K \sqrt[3]{\frac{W^2}{HP}}$$

where K is a constant of pro-

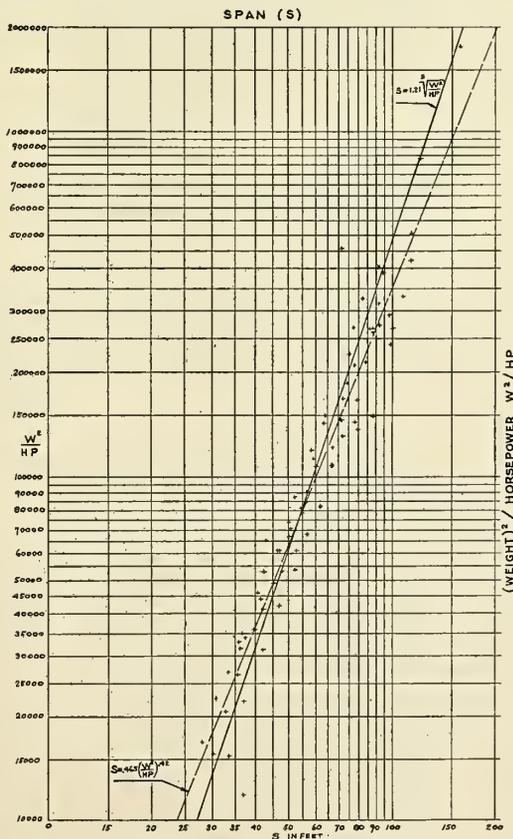


Chart showing span-weight-horsepower ratio

portionality and can be determined only by experiment.

Experimental Verification

In order to make an experimental verification of the above formula, the author calculated the constant for more than one hundred airplanes. Its average value was found to be 1.21 although the range was rather large, varying from .95 to 1.60.

All of the airplanes for which the constant was computed were monoplanes, although biplanes could have been used just as well if their equivalent monoplane span had been used in place of their geometric span. They were excluded as a means of reducing the routine calculations which were laborious enough without having to make span factor corrections.

The airplanes represent all sizes and nationalities, ranging from a 600-lb. small single seater sport plane of 30 horsepower to the German DO-X with a flight weight of 52 tons and 7200 horsepower. They include distance and endurance record machines as well as the trim Schneider Trophy racers of last year; also flying boats, land planes, seaplanes and amphibians.

The results were plotted on logarithmic paper to enable a check of the exponent $1/3$ as well as the constant 1.21. The solid line represents the theoretical equation derived above. The dotted line was drawn thru the points in a manner to more nearly express the true relation as shown by current design practice.

The equation of the dotted line is

$$S = .465 \left(\frac{W^2}{HP} \right)^{.42}$$

The difference in the exponent of .42 in place of the theoretical $1/3$ is explained simply by current design practice. Most small planes are built to limited overall dimensions because of hangar space, maneuverability, etc., while most large airplanes are multi-engined and hence have considerable wing interference. Thus, if we take the middle group of airplanes, those with values of W^2/HP of about 100,000, we see that the small planes appear to be under-spanned while the bigger ones seem to be over-spanned, bearing out these observations. As larger and more suitable engines are developed for the larger and more powerful machines, and the restrictions become less severe in the smaller group, the dotted line will be expected to gradually swing over to a more nearly parallel attitude, although it may never reach it because of the limitations imposed. A similar case was encountered when a practical check was made on the formula for the speed of an airplane in terms of its wing area and horsepower $V = K (HP/A)^n$. The experimental

check showed that $n = .39$ was a better value than the theoretical $1/3$.

The writer believes that the experimental verification of the theoretical formula is sufficient to justify its use as a criteria of design practice if consideration is given to such interferences and influences as obstructions in the leading edge of the wings, fuselages in the case of low wing monoplanes, engine nacelles, and the like. He also believes that it is better to use the theoretical formula and make proper allowances for these disturbing features than to use the empirical formula verbatim, although a check on the final decision by the empirical formula should be useful as an adjunct to one's judgment.

MAXIMUM LIFT

(Continued from page 22)

leading edge. In such a case, the growth in thickness of the boundary layer must be very rapid at the leading edge. At the same time the leading edge of a thin, symmetrical airfoil at high angles of incidence cannot be conducive to smooth flow. It may be supposed therefore that the transition from laminar to turbulent flow occurs very near to the leading edge. It does not follow that the separation occurs near the leading edge. The turbulent flow is merely a flow with increased viscosity; its further retardation and separation is akin to that of the laminar flow. After the transition point has been passed, the flow is actually helped by the fact that the adverse pressure gradient drops off sharply.

The effect of increased scale will shift the transition point still nearer to the leading edge (but cannot move it very far) and this is helpful to the lift. On the other hand increased scale will act adversely in the region of turbulent flow. The two effects should balance one another and the effect of scale should not affect the lift very much.

Thin, Non-Symmetrical Airfoils

As the lift is now the resultant of the lift of the straight line, and the lift due to camber, the pressure gradient at the leading edge of the R.A.F. 15 (see figure 11) is not as high as that of the thin symmetrical airfoil. The nose is also better adapted to smooth flow. The transition point should occur further aft, and increase in scale can be really effective in advancing the transition point. Hence, for thin, non-symmetrical airfoils there should be a definite increase in lift with scale.

Medium Non-Symmetrical Airfoils

Here the pressure gradient is even less marked at the leading edge (figure 12), and the nose still better shaped. The

transition point should be still further aft and the effects of increased scale should be even more marked.

Highly-Cambered, Thick Airfoils

Here the pressure is much more uniformly distributed over the upper surface of the airfoil. The transition point should occur very late. And that is partly how the high lift and large angle of maximum lift of such airfoils may be explained. The increase in scale may shift the transition point further forward but the retardation in the predominant laminar flow is also magnified. Hence, with highly-cambered airfoils, the effects of increased scale may actually be detrimental to the value of the maximum lift. (Göttingen 387—figure 13.)

Conclusion

Granted that the turbulence in flight is very low relative to the linear dimensions of the flow, it may be concluded that the average turbulent tunnel will not, even at a high Reynolds' Number, give correct values to the maximum lift coefficient. In transposing maximum lift from a wind tunnel test to full scale, a great many factors have to be taken into consideration. But if the turbulence of the tunnel and the scale are correlated with the profile and probable pressure gradients, the transposition should not be hopeless.

In Part 2 of this article, available experimental data will be examined in the light of the above elementary theory, so that the airplane designer may more intelligently evaluate the maximum lift coefficient of an airfoil.

References

- H. L. Dryden and A. M. Kueth, "Effects of Turbulence in Wind Tunnel Measurements" N.A.C.A. T.R. 342.
 Eastman N. Jacobs, "The Aerodynamics of Wing Sections for Airplanes" S.A.E. Chicago, September 1933.
 C. B. Millikan and A. L. Klein, "The Effect of Turbulence" Aircraft Engineering, August 1933.
 I. E. Garrick, "Determination of the Theoretical Pressure Distribution of Twenty Airfoils" N.A.C.A. T.R. 465.

MILITARY USE OF AUTOGIROS

(Continued from page 15)

real for handling it. The air resistance of 3,000 feet of exposed cable would be approximately 25 pounds at a speed of 35 m.p.h. From this it will be seen that the weight and drag of such a cable offers no special difficulties.

With a complete telephone system contained in the giro and a hand phone at the lower end of the cable, it would be possible to keep in contact with the home observation post, and the giro could be used in messenger service to fly and telephone information to any outpost without the necessity for landing. This would be a valuable aid, not only in daytime opera-

tion back of the lines, but could be used for night observation (similar to the use in open warfare to which the cavalry was put) which would give the armed forces using giros for this purpose a definite advantage over forces using old methods.

Even in clear weather the use of the balloon is dependent upon wind conditions, because pitching and rolling caused by rough air make it difficult for the observer to focus his attention on a particular point. Here the giro would prove another point of superiority, since the relatively high loading of the blades would damp out much of the turbulence caused by rough air. Thus observation from the giro would be possible at times when the balloon would be grounded by weather conditions. Also, when the ceiling is low and the weather thick, the giro could fly close to the ground out over the area to be observed and information telephoned back. This would be an impossi-

ble mission for the balloon, which, due to the low ceiling, could not obtain sufficient height to make the observation. In foggy weather the giro can fly close to the ground with comparative safety, and due to good maneuverability, would be less vulnerable from attack than fixed wing aircraft.

Advantages of the giro over all types of balloons for this particular type of military work can be summed up as follows:

Initial cost approximately similar but greater life. Requires less personnel for operation and maintenance. Can transport itself and also reduce the supplies required. Can defend itself and can take an active part in defensive aerial warfare. Can be kept in operation during stormy or foggy weather. Is more mobile than a balloon and requires but little equipment for direct communication with the ground.



Digest of Technical Articles from Foreign Publications

ELSA GARDNER

Incidence Indicator

Crocco Indicator of Incidence (Indicatore di incidenza "Crocco") A. Gigli. *L'Aerotecnica*, Vol. 13, No. 8, August, 1933, pp. 1012-1020, 7 figs.

EXPERIMENTAL RESULTS, obtained with two airfoil sections fitted with a Krell pressure nozzle carried by an arm perpendicular to the leading edge and capable of rotating about it, are described. By means of this device, it was possible to find for every wing attitude that particular value of the angle of incidence formed by the arm with the airfoil chord, for which angle the differential pressure of Krell is equal to zero. The appendix contains a theoretical study of the problem by C. Ferrari.

Oil Cooling

Oil Cooling for Aircraft, B. C. Carter. (British) *Aeronautical Research Committee—Reports and Memoranda No. 1486*, September, 1931 (published September 13, 1933), 58 pp., 36 figs.

MEANS OF oil cooling for aircraft are reviewed and the problem analyzed. In the first section the basic quantities involved are reviewed and some values are given for reference purposes. In the second section a quantitative analysis is made of the rate of the transference of heat from oil to metal and from metal to

air. Types of oil coolers in use, under trial, or proposed, are also described with the results of tests, while the use of an intermediate fluid in the cooling of oil is considered with tests results in the appendix.

Aircraft Noise Reduction

The Reduction of Aircraft Noise, R. S. Capon. *Engineering*, Vol. 136, Nos. 3537, 3538, October 27 and November 3, 1933, pp. 475-477 and 503-504, 6 figs., 5 tables.

FURTHER EXPERIMENTAL work in progress at the National Physical Laboratory, Royal Aircraft Establishment, and Air Defense Experimental Establishment to improve the standard of quietness in airplanes is described. The author explains the design of the Siemens-Barkhausen audiometer which was used in the experiments, points out the relation between loudness and physical intensity, and takes up the phenomenon of masking one sound by another. In concluding, he gives the noise of the propeller in cruising flight at 15 ft. distance and considers the effect of size of propeller, number of blades, and operating conditions as of secondary importance. The noise of the engine exhaust was found to be 80 decibels at 15 ft. in cruising flight, and may be reduced to a low level by the baffle-

type silencer, but this increased the risk of fire in case of a crash. Engine clatter in a water-cooled engine was less than 72 decibels. The combined noise of propeller and engine in cruising flight could be reduced by the use of lower tip speeds, but the improvement obtained is limited by the exhaust noise. By soundproofing the cabin, a 20-decibel reduction in noise may be secured at the cost of some increase in weight.

Paper presented before Section G of the British Association.

Magnesium Alloys

Study of the Purifying Flux and the Protection of Magnesium and Its Alloys During Their Fusion in the Crucible and Their Cooling in Molds (Étude des flux d'épuration et de protection du magnésium et de ses alliages pendant leur fusion dans les creusets et leur coulée dans les moules), M. Hardouin. *Publications Scientifiques et Techniques Du Ministère De L'Air, Services Recherches De L'Aéronautique*, 1933, No. 28, 46 pp., 32 figs., 6 tables.

IN THIS study of casting magnesium alloys the author shows the fundamental part played by the viscosity of the fusion fluxes and of the covering used in casting magnesium, a part as important as that of the fusibility and density of the fluxes. He describes a torsion viscosimeter which was designed to measure the flux viscosity in absolute values. He tells the results of research with melting fluxes with a well-known chloride base and with a base of fluorides, as well as of a covering flux with a base of boric acid and sodium borate, the last giving complete satisfaction in laboratory and industrial tests. It was found that the use of these fluxes in cast pieces of magnesium eliminated the presence of chloride, the residual traces of which are a further source of corrosion. A flux of sand with a base of fluorspar and ammonium sulphate was also studied as it was a cheap product and suppressed the incorporation of fluoride of ammonia in sand castings.

Wing Vibration

Free Vibrations on Solids and Indifference of the Elastic Equilibrium on Shafts and Wings (Vibrazioni libere nei solidi e indifferenza dell'equilibrio elastico negli alberi e nelle ali), C. Minelli. *L'Aerotecnica*, Vol. 13, No. 8, pp. 996-1011, 5 figs.

PROBLEMS OF the stability of elastic equilibrium in which the importance of external forces is a function of the deformations produced by these forces on the whole are discussed. In taking up the critical speeds of shafts and wings, the author recalls and extends the well-known analogy between the critical speeds of a shaft and the true frequencies of flexional vibrations of a beam, setting forth a new analogy between the critical speeds of a single-spar wing and the true frequencies of torsional vibrations of a solid.

Bakelite

Artificial Resin and Its Development for Airplane Construction (Kunstharzstoffe und ihre Entwicklung zum Flugzeugbaustoff), O. Kraemer. *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*, Vol. 24, Nos. 14 and 15, July 28 and August 14, 1933, pp. 387-393 and 420-426, 24 figs.

PROPERTIES of artificial resins were determined to find a suitable material for airplane parts. The author describes the results of static and dynamic tests of the commercial types of bakelite, showing its advantages for instrument cases and boards, control-cable rollers and similar parts, due to its light weight and high corrosion and moisture resistance. As the commercial types of bakelite were found to be inferior to wood for highly stressed parts, new types of artificial resin were investigated, the manufacture and tests of which are outlined. By combining thin doped veneer with bakelite a material was developed which had advantages over wood in regard to resistance to compressive and bending stresses, particularly to transverse fiber stresses, while it retained the high moisture and weather resistance of bakelite. A combination of these materials was made by means of riveting with aluminum rivets, as well as by joining with casein glue.

Variable-Compression Engines

Engines with Variable Compression Volume (I motori a volume di compressione variabile), P. Ferretti. *Rivista Aeronautica*, Vol. 9, No. 8, August, 1933, pp. 300-308, 4 figs.

CONTINUING his discussion from previous issues of the problems of supplying an airplane engine with sufficient air at altitudes to maintain sea-level power, the author suggests the variation of the compression volume as the most convenient means of obtaining the same maximum pressure at high altitudes. He demonstrates the advantages in efficiency, temperature and power which are necessary for an airplane engine. He illustrates the methods formerly used for obtaining a variable compression ratio in an engine and indicates a possible means for increasing the cylinder volume with higher altitudes which would be particularly adaptable to a radial engine. He refers to the work of the R. Scuola di Ingegneria di Naples in studying the mechanical problems of such an engine.

Flight Records

A Simplified Scheme of Records, E. Everling. *Aircraft Engineering*, Vol. 5, No. 56, October, 1933, pp. 227-228, 3 tables.

THE PRESENT classification of flight records adopted by the Federation Aéronautique Internationale is criticized with a suggested scheme of simplification. The author considers the weakest point of the present classification is the numerous speed records. He points out

the fact that of the 186 records open to different categories of airplane, only 98 have been considered of sufficient importance to be worth attempting. He shows that many of these records are of no practical utility and in some cases, when taken from the point of view of efficiency of performance, progress over five years has actually been retrograded. Among the suggestions, he proposes omitting the women's records altogether and dispensing with the duration flight.

Rough Surface Effects

Flight Measurements for Determining the Effects of Surface Roughness (Flugmessungen zur Bestimmung des Einflusses der Oberflaechenrauhigkeit), H. Ebert. *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*, Vol. 24, No. 19, October 14, 1933, pp. 529-532, 7 figs.

RESULTS OF flight tests with an airplane on which the smoothness of the surface was varied are described. The test confirmed the fact that differences between model and flight-test results in most cases moved back the corresponding polars, due to the condition of the airplane surfaces. One corrugated metal airplane with only the wings covered with celloned or highly polished lacquered linen showed, for an increase in lift coefficient, a growing improvement of the drag coefficient over the corresponding values of the original airplane. The smoothed forward portion of the wing prevented a premature breaking away of the flow in gliding at zero thrust, as well as in flight with the propeller operating, attaining in either case higher values of lift coefficient. The additional drag due to the slipstream effects was not altered by the smoothness of the wing surface. Another smooth covering for both the wing and fuselage showed no further rise of lift coefficient in comparison with a further reduction of drag coefficient, while with the slipstream effect, the additional drag was very much diminished due to the smooth fuselage surface, and elevator flutter disappeared.

Wing Torsion

On the Effect of Stiff Ribs on the Torsional Stiffness of Aeroplane Wings, H. R. Cox and D. Williams. (British) *Aeronautical Research Committee—Reports and Memoranda No. 1536*, January 5, 1933 (Published August 14, 1933), 18 pp., 3 figs.

ATTENTION is drawn to the advantages, when designing for high torsional wing stiffness, of making some of the wing ribs stiff against distortion, both in flexure and in torsion. It is concluded that the torsional stiffness of the spars should be as great as possible, compatible with their flexural moduli. Spars should be joined together near the wing tip by a rib very stiff in its own plane. If spars are tapered appreciably, this should be augmented by adding one or two more ribs stiff in their own planes in the taper region, and all ribs should be firmly attached to the spars.

Parachute Jumps

Jumping with a Parachute from an Airplane Flying at High Speed (Lanci con paracadute da apparecchi volante forte velocità), A. A. P. Freri. *Rivista Aeronautica*, Vol. 9, No. 8, August, 1933, pp. 261-299, 20 figs.

IN MAKING a parachute jump from an airplane flying horizontally at a speed of about 186 m.p.h., the author observes that the human organism may be subjected to intolerable stresses. On the basis of experimental data and theoretical calculations, he proposes a means for overcoming such inconveniences. Among other methods, he concludes with the suggestion that the parachute be launched with a greatly retarded opening and explains the fact that after a long fall the parachute attains a sinking speed very much lower than the horizontal velocity of the airplane. This renders possible the opening of the parachute without any large stresses.

Propeller Vibration

Propeller Vibrations (Luftschraubenschwingungen), M. Hansen and G. Mesmer. *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*, Vol. 24, No. 11, June 6, 1933, pp. 298-304, 10 figs.

A SIMPLE METHOD is given for calculating the natural bending vibration of a propeller. With the help of simple model tests, the calculated values were checked and found to be in agreement with those measured. The influence of the centrifugal force on the rate of vibration during the run was also ascertained. The authors demonstrate that for important results in practice, the existence of the first vibrations of the higher order in working conditions for high-speed propellers can be detected. It was also determined that the excitation of the vibrations started from operating when overbalanced.

Lifting Propellers

The Aerodynamic Principles of the Lifting Propeller (Die aerodynamischen Grundlagen der Tragschraube), M. Schrenk. *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*, Vol. 24, Nos. 15, 16 and 17, August 14 and 28, September 14, 1933, pp. 413-419, 449-454 and 473-480, 29 figs.

IT IS shown in this report of the DVL that the flow on the lifting propeller in level flight appears to be reduced along the simple symmetrical streamline by the axial autorotating propeller blowing against it. By means of the simple formulas derived, one may acquire the fundamental laws for the rate of flow and tip speed, and also for the theory of thrust of the lifting propeller which agrees absolutely with model tests. The author points out the possibilities of radical errors in some hypotheses and shows how they may be avoided. The total loss expressed by means of the lift/drag ratio he divides into three partial losses, namely, the induced loss, the flow losses and the unsymmetrical losses.

Directional Stability

Explanation and Calculated Examples of the Directional Stability Theory (Ergänzungen und Berechnungsbeispiele zur Seitenstabilitätslehre), G. Mathias. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 24, Nos. 19 and 20, October 14 and 28, 1933, pp. 527-529 and 563-568, 8 figs.

THIS REPORT supplements the DVL Report No. 272 concerning the theory of directional stability, further explaining the results obtained and their technical interpretation. Three numerical examples are given to show in what way model measurements may be evaluated for checking the directional stability. The last example indicates how the static directional stability is influenced by the size of the vertical tail surfaces, the V-form of the wings and the center-of-gravity position as well as the flying attitude. A series of diagrams for different arrangements of parameters and variable axes illustrate these methods.

Valve-Spring Design

The Design of Valve Springs, F. Nixon. Aircraft Engineering, Vol. 3, No. 55, September, 1933, pp. 193-196, 3 figs., 5 tables, Bibliography.

SALIENT points affecting the design of valve springs for aircraft engines are outlined and a simple and rapid method for designing springs is described. The method is the result of research carried on by the British Springs Research Committee of the Department of Scientific and Industrial Research. After taking up surge in helical springs and methods of reducing it, particularly by varying the natural frequency, the author discusses valve-spring material and gives Air Ministry specifications for valve-springs and wire. He illustrates with curves the fatigue limits and stresses in valve springs with special reference to the "Roever" effect. Formulas given for the design of valve springs differ from those usually employed in that they take into account the curvature of the wire.

Long-Range Airplanes

Commercial Aeroplane Design, A. R. Weyl. Aircraft Engineering, Vol. 5, No. 56, October, 1933, pp. 223-226, 6 figs.

POSSIBILITIES of the high-speed long-range transport airplane are examined and the design of such an airplane for a 1250-mile route over level dry ground is discussed. The author suggests a four-engined airplane for this purpose and a multi-wheeled landing gear with several wheels arranged one behind the other, and considers the use of a caterpillar drive a very promising line of thought. He explains why he thinks the possibilities of the heavy-oil compression-ignition engine should not be overestimated. He draws attention to the curious neglect of the slotted wing as a method of improving the speed range and reminds the reader that slots become of

increasing value as the wing loading goes up. He states that modern European commercial airplanes are aerodynamically much in need of refinement and points out that intelligent use of the phenomenon of aerodynamic interference might help in achieving a higher ratio between maximum and minimum speed.

Airplane Design

The Degree of Perfection Attained in Aeronautical Construction. First Decennial of Italian Aeronautics (Il grado di perfezionamento raggiunto nelle costruzioni aeronautiche), A. Fiore. L'Aerotecnica, Vol. 13, No. 9, September, 1933, pp. 1133-1180, 89 figs.

THE MOST impressive aspect of the progress achieved in aircraft construction the author considers is given by the continuous increase in airplane speeds, which has been attained not so much by increase of power as by refinement in aerodynamic form. He examines the improvements made in the aerodynamic and technical fields, including that of materials employed. Dealing with foreign designs as well as Italian, he takes up the various types of wing structure, fuselage, engine mount, landing gear, brakes, tail wheels and floats. A study of equipment is followed by that of the engine-propeller system and the paper closes with a discussion of the safety problem.

Recent Patents

The following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office and compiled by R. E. Burnham, patent and trade-mark attorney, 511 Eleventh Street, N. W., Washington, D. C.

Landing gear for aircraft. Holland S. Duell, Larchmont, N. Y. (1,929,630)

Aircraft propulsion. Charles B. Huntman, Plainfield, N. J. (1,929,690)

Propulsion of aircraft. Robert H. Goddard, Worcester, Mass. (1,929,778)

Method of forging cylinders for airplane motors. Charles A. Brauchler, Canton, O. (1,929,802)

Gyroscopic compass and automatic steering device. Johann M. Boykow, Berlin-Lichterfelde-West, Germany (1,930,082 and 1,931,401)

Gyroscopic instrument and apparatus. James B. Henderson, Lee England (1,930,096)

Supercharging of internal combustion engines. Archibald Hall-Brown, Surrey, England, assignor to Bendix Aviation Corp. (1,930,198)

Airplane. John E. Hanson, Richmond, Va. (1,930,199)

Supporting surface for aircraft. Herbert K. Binks, Nairobi, Kenya Colony, Africa. (1,930,380)

Automatic airplane releaser. Ernest Aiello, Walla Walla, Wash. (1,930,462)

Aerial navigation instrument. Junius W. Jones, Washington, D. C. (1,930,478)

Internal combustion engine. Archie M. Niven, Detroit, Mich., assignor to Continental Aircraft Engine Co. (1,930,533)

Propeller with variable pitch. Marius J. Barbarou, Neuilly-sur-Seine, France. (1,930,548)

Brake shoe. Robert F. Kohr, South Bend, Ind., assignor to Bendix Aviation Corp. (1,930,718)

Airplane running gear. Isaac M. Laddon, Dayton, and Sidney P. Lyon, Tippicanoe City, O.; said Laddon assignor to Bendix Aviation Corp., and said Lyon assignor to Bendix Brake Co. (1,930,720)

Magnetic compass. Fred G. Schweisenthal, Chicago, Ill., assignor to Stewart-Warner Corp. (1,930,775)

Aneroid (altimeter) and operating means therefor. Paul Kollsman, Woodhaven, N. Y. (1,930,899)

Amphibion aircraft. Vincent J. Bunnelli, New York, N. Y., assignor to Bunnelli Aircraft, Ltd. (1,930,922)

Retractable landing gear. Gabriel Midboe, Brooklyn, N. Y., assignor to General Aviation Corp. (1,931,137)

Parachute. Samuel H. Knight, Lancaster, Pa. (1,931,160)

Eight-cylinder radial motor. Bernard L. Baisden, Los Angeles, Cal. (1,931,401)

Airplane. Walter Barbyson, Montreal, P. Q., Canada. (1,931,753)

Method and apparatus for hauling aircraft upon watercraft. Hermann Hein, Bremen, Germany. (1,931,820)

Aircraft airfoil. Alexander Lippisch, Fliefelager-Wasserkuppe, Germany (1,931,928)

Aerial vehicle and braking system therefor. Paul Hallot, Paris, France. (1,932,094)

Direct reading pitchometer. Bert O. Godfrey, Brooklyn, N. Y. (1,932,103)

Aircraft steering system. Adolf Urfer, Richmond Hill, and Paul W. Koch, Brooklyn, N. Y., assignors to Bendix Aviation Corp. (1,932,330)

Inspection device for airplanes. John M. Harding, New Brunswick, N. J., assignor to Nixon Nitration Works, Nixon, N. J. (1,932,342)

Airplane construction and method of fabricating. Ralph D. Weyerbacher, Commander, Construction Corps, U. S. Navy. (1,932,430)

Airplane structure. John H. Smith, Camp Hill, Pa. (1,932,681)

Combined helicopter and engine. Jesse D. Langdon, Los Angeles, Cal. (1,932,702)

Airplane construction. Giuseppe M. Bellanca, New Castle, Del. (1,933,001)

Aircraft. Harold Bolas, Providence, R. I. (1,933,307)

Landing gear for airplanes. Frank B. Bell, Pittsburgh, Pa., assignor to Edgewater Steel Co. (1,933,361)

(Continued on page 31)



The Northrop Delta

HIGH-SPEED, LONG-RANGE TRANSPORT PLANE

● In its general design, the Northrop Delta low-wing transport monoplane, developed for long-range, high-speed cargo and passenger service, is similar to the Northrop Alpha transports now flying the Los Angeles-New York overnight air mail. It has, however, more than 100 per cent greater payload capacity and increased performance for a given horsepower. These features are the result of extended structural developments and wind tunnel investigations. Refinements of structural details have been made which, combined with the use of the new 24 SRT Alclad instead of 17ST formerly used, have provided an all-metal full cantilever airplane of 45 per cent greater gross loading than the Alpha with only a small increase in the empty weight.

In the Delta model, the pilot is placed forward of the passenger compartment and just to the rear of the firewall to provide maximum visibility. The cockpit is covered with a sliding enclosure. The fuselage diameter is large enough to permit a seating arrangement of either two or three abreast, an aisle between.

Features of easy servicing and maintenance include a quickly-detachable rubber-bushed alloy steel engine mount, jugged inter-changeable cowling, fully-enclosed ball bearings on all controls and oversize bushings and joints at all points of wear.

Stability is positive in all directions enabling a level course to be maintained for long periods without touching the controls. Full lateral control is maintained beyond the stalling point of the wing, even with flaps down.

A reduction in landing speed and length of glide has been obtained by the use of split trailing edge flaps. With the flaps in full down position the maximum lift of the airfoil is increased 35 per cent and the drag by 300 per cent. The combination extends the usefulness and safety of the ship as many small fields, hitherto considered unsafe, can be flown into and out of by the average pilot.

The fuselage is of all-metal stressed skin monocoque structure with longitudinal stiffeners and large oversize reinforcing rings. Permanent jugged as-

sembly of the fuselage and center section forms a rigid integral unit of these two parts. Six gasoline tanks of 340 gallons capacity are installed in the center section, permitting long range operation when desired without encroaching upon cargo space within the fuselage.

The attractively finished cabin provides accommodations for eight passengers and contains approximately 200 cubic feet of available space. The cabin is 57 inches wide and 60 inches high and the fully upholstered seats are 19 inches wide, with an aisle between offering comfort and ample leg room. Individual windows, reading lights, ash trays and ventilation control are provided at each seat. A second heating and ventilation system, controlled from the cockpit, admits into the cabin either heated air or air at outside temperature. The cabin is unusually quiet, due to the use of sound-deadening insulation throughout.

The passenger compartment entry door is on the left side of the fuselage and an emergency exit is available from the forward right side of the ship. A lavatory may be installed by eliminating one of the rear seats.

Thirty-five cubic feet of space is available for cargo in a compartment aft of the cabin.

A Wright Cyclone SR 1820 F-3 rated 710 h. p. at 5,500 feet altitude or a P. & W. Hornet of similar horsepower rating is used. These engines use 87 octane gasoline, so when a lower octane fuel is desired there will be a small decrease in performance corresponding to the decreased horsepower output. The Cyclone engine has the following specifications: Direct propeller drive; rated r. p. m., 1,900; power at sea level, 625 h. p.; power at 5,500 feet, 710 h. p.; compression ratio, 6:4; blower ratio, 8:3; maximum manifold pressure, 34.5 inches mercury. The metal propeller used is a Hamilton Standard adjustable pitch type.

Four quickly detachable fittings form the engine mount attachment to the firewall. The use of specially designed rubber bushings prevents a large part of the



Northrop Delta recently completed for the Aerovias Centrales line

engine and propeller vibration from being transmitted to the cabin.

A stainless steel exhaust collector ring is provided. Engine controls, wiring, fuel system, and instrument leads have quickly detachable connections which make possible replacement of the entire power plant assembly within 30 minutes. Easy access to the engine accessories is possible through inspection cover plates or by removal of the cowl which is assembled in three sections.

The oil tank of 20 gallons capacity is mounted on the engine bearing members and forms a unit which is removable with the power plant assembly. The tank is accessible for service and as a result of ventilation, proper oil temperatures are maintained, even under severe operating conditions.

The landing gear consists of four cantilever Cleveland oleopneumatic struts with streamline fairing enclosing the entire assembly. All parts of the gear, including the fairing, are quickly detachable, making tire change and wheel inspection a rapid operation.

Carefully developed streamlining provides an aerodynamic efficiency in the gear almost equal to full retraction but with greater simplicity and less weight.

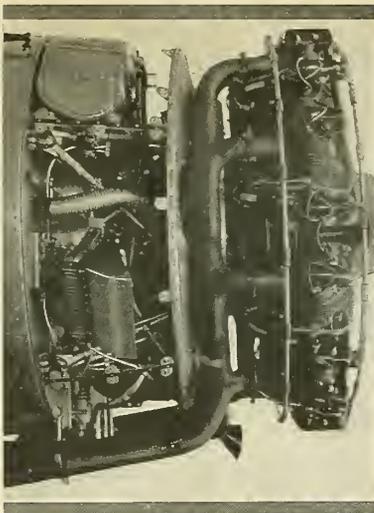
Wheel tread is 9 feet. The Bendix internal expanding brakes are differentially controlled by rudder pedals and the brakes may be set with a parking lever in the cockpit. Tires are 36 x 8 inches.

Provision Made for Floats

Floats are easily installed; a bulkhead placed in the junction of the wing and center section distributes all landing loads and provides easy attachment for float struts and brace wires. Water rudders are used to assist in taxiing cross-wind and in congested areas. Skis are likewise easily installed except that special oleo struts are attached through rigid struts to the regular landing gear fitting in the center section.

Split trailing edge flaps are mounted on the under side of the wing as the most effective means of increasing lift and drag for slow, restricted landings. In full down position the maximum lift of the airfoil is increased 35 per cent and the drag by 300 per cent. Landing speeds are reduced approximately 15 m.p.h. by the use of flaps. With flaps in down position the ailerons remain positive in action and are effective even beyond the stall of the wing. The flaps are operated from the cockpit either manually or by a switch controlled electric motor.

The wing is of all-metal stressed skin multicellular construction. By the use of stiffeners of high efficiency a wing of unusual strength-weight ratio is obtained. Tension and compression loads are carried on the surface, shear loads only being carried in internal webs. Thus, a



Engine installation details

visual inspection of the exterior shows the structural condition. The airfoil section used is the NACA 2400.

Ailerons are of the slotted type, statically and dynamically balanced and are effective throughout the entire speed range. They are mounted on ball bearings and stick forces are very light, even at high speeds. Control cables throughout the ship pass over ball bearing pulleys.

Stressed Skin Tail Surfaces

Stressed skin multicellular structure is used for tail surfaces. Horizontal and vertical stabilizers are rigidly mounted

and are adjustable on the ground. Fore-and-aft trim during flight is accomplished by the use of flettners on the elevators and controlled from the cockpit. Ball bearing mountings are used on the hinges of all control surfaces.

The tail wheel is of the full swivel type and may be locked in the forward position from the cockpit.

Access to the cockpit is gained through the sliding enclosure which is fully adjustable in flight. The cockpit may also be reached from the cabin. Ventilation and heating are provided for the pilots.

The upholstered seat is adjustable and equipped with a removable cushion. All controls are accessible to the pilot while in normal sitting position.

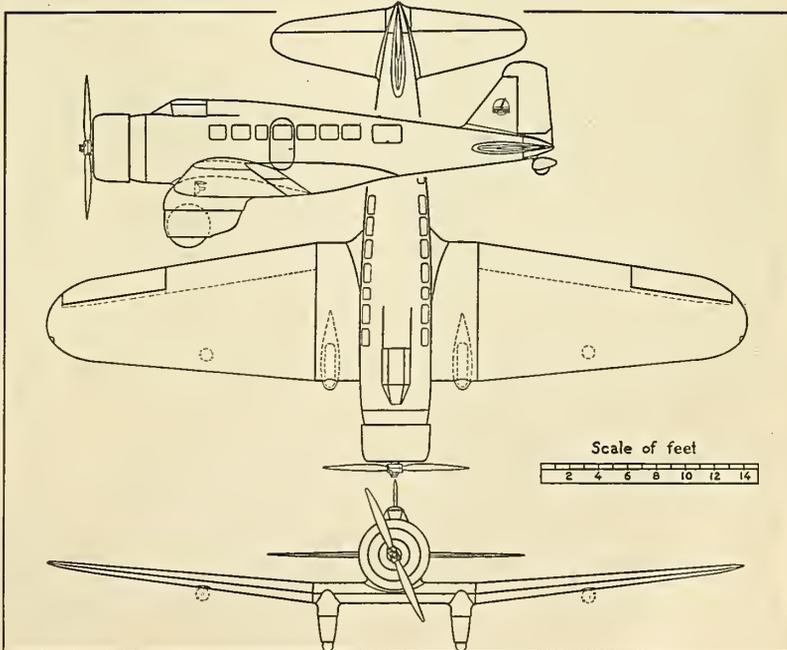
Instruments and Equipment

The instrument board is mounted in rubber which dampens vibration.

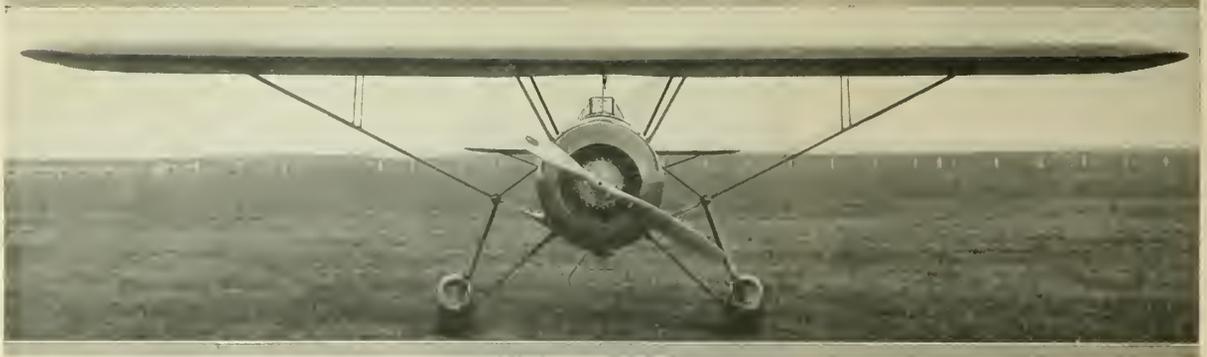
The following equipment is provided:

Instruments (Pioneer unless otherwise specified): airspeed indicator (300 miles); altimeter; bank-and-turn indicator; ball bank indicator; rate-of-climb indicator; compass; Waltham tachometer; oil and fuel pressure gauges; oil temperature gauge; fuel quantity gauge; combination Weston voltmeter ammeter supercharger pressure gauge. A Sperry artificial horizon and directional gyro may be installed as optional equipment.

Miscellaneous equipment: pressure fire extinguisher; hand fire extinguisher; first aid kit; eight ash trays; log book and container; set emergency tools (not *Continued on page 31*)



Three-view outlines of the all-metal Northrop Delta monoplane



New Warner-Powered Fairchild 22

● Since the production of the "22" several years ago, this model has been gradually improved and advanced in design. The latest model, first of the series to be powered with a radial engine, lends itself to excellent streamlining and filleting.

While it is of the same basic design and structure as the standard 22, the latest type 22 with the Warner installation is more fully faired from the NACA cowl to the tail, and has the appearance of being a much larger ship.

The 22 is a high-wing open cockpit monoplane of the strut braced type. Cockpits are tandem, roomy, and comfortable. The landing gear shock-absorbing strut attaches at the outer point of a tripod rigidly fixed to the fuselage at the point where the steel tube wing bracing terminates.

The fuselage is of welded chrome molybdenum steel tubing. Square tubing is used for the longerons and a number of vertical members, and round tubing for the remaining diagonal and horizontal members. This construction has produced better fitting and welding, reduces the cutting required, and results in greater strength. Upon completion of all welding operations, the fuselage is sand-blasted, and primed with an aluminumized red oxide primer. The superstructure supporting the fairing also is of steel tubing, the fairing strips being of aluminum.

The wing is constructed in two panels joined in the center. The section used is the N22. Spars are of the I-beam section, consisting of center web and cap strips of spruce. Ribs are of 1/4-inch spruce, fastened with plywood gussets, glued and nailed. Wing fittings have been designed to require little welding, and are sand-blasted before being cadmium plated or baked enameled.

The ailerons are entirely constructed of metal, and each consists of a formed spar to which stamped ribs are applied. A stamped cover sheet is riveted to this unit, the combination resulting in an aileron of unusual torsional stiffness.

Control rods are attached directly to the inboard ends of each aileron, eliminating all bell cranks and wires. Each aileron is attached to the rear wing spar through four steel tube-bearing struts or brackets, which attach to the drag stations of the wing, these stations being further reinforced by welded steel N struts. Aileron brackets are equipped with grease seal pack ball bearings in which the aileron operates.

Controls are of simplified design, attached directly to the fuselage members rather than to a built-up superstructure or the cockpit floor. Ball bearings are used throughout to insure the elimination of play and trouble-free operation for the life of the plane. Dual controls are standard equipment.

Tail surfaces (excepting the fin) are

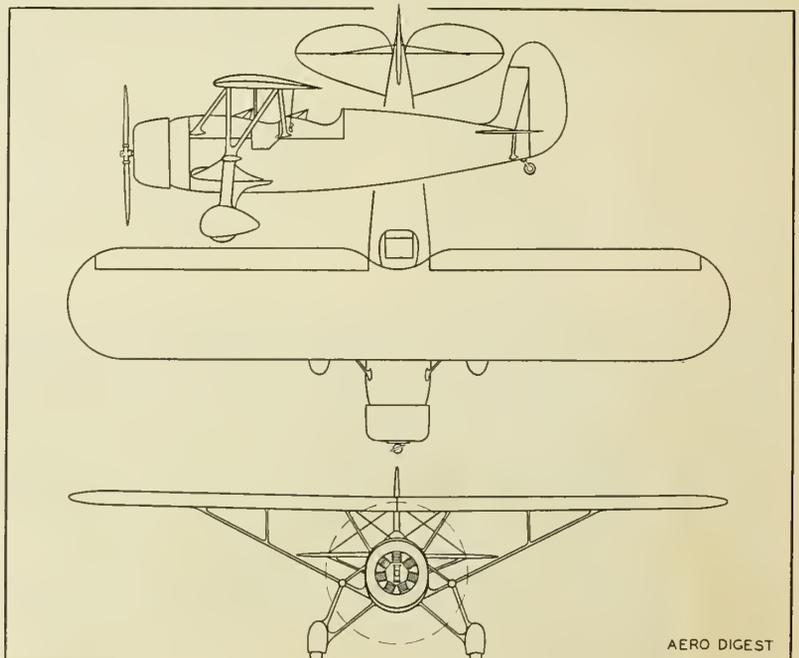
of fabric covered steel tube construction. The stabilizer is externally braced by means of streamlined tubing.

The main upright support of the fin is of wood and easily attaches to a channel which forms the tail post of the fuselage. The type of cantilever construction used results in a fin of unusual stiffness.

The stabilizer is adjustable from either cockpit by a small crank. It is simple, direct, and positive in action.

The landing gear is of the split-axle type, having an unusually wide tread of 7 feet 7 inches. Shock absorbers are of the oil and spring type, having a total travel of 8 inches. Removable bronze bushings are used at all points of wear.

The ship may be powered with the Warner Scarab 125 h.p. or Super-Scarab 145 h.p. engine. Fuel is carried in a



AERO DIGEST

Outline view showing clean lines of the new Warner-powered Fairchild 22

single 30-gallon tank installed in the fuselage forward of the front cockpit, and the wing provides for the installation of additional tanks of 20 gallons capacity.

An instrument panel which can be installed or removed as a unit contains the following instruments as standard equipment: air speed indicator; altimeter; tachometer; compass; oil pressure and temperature gauges.

Provision is made in the panel for easy installation of a turn-and-bank and a rate-of-climb indicator.

Specifications

Wing span	32 feet 10 inches
Length overall	22 feet
Height overall	7 feet 9 inches
Wing area (including ailerons) ..	170 sq. feet
Aileron area	29 square feet
Stabilizer area	15.8 square feet
Elevator area	10.4 square feet
Rudder area	9.4 square feet
Fin area	4.1 square feet
Wing loading	10.3 pounds per square foot
Horsepower	125 145
Power loading	14 Lbs./H.P. 12.1
Empty weight	1102 pounds 1133
Useful load	648 pounds 617
Pay load	275 pounds 244
Weight of baggage	105 pounds 74
Gross weight	1750 pounds 1750
Top speed	133 M. P. H. 145
Cruising speed	112 M. P. H. 118
Landing speed	44 M. P. H. 44
Rate of climb	750 Ft. P. M. 905

RECENT PATENTS

(Continued from page 27)

Gyroscopic compass. Arthur L. Rawlings, London, England, assignor to Sperry Gyroscope Co. (1,923,885)

Radio beacon course shifting method. Frank G. Kear, Minersville, Pa., assignor to U. S. Government. (1,923,934)

Hydroplane. Erwin Wesnigk, Berlin, Germany. (1,923,958)

Aerial safety device. Ibrahim Ben Ayad, Paris, France. (1,923,963)

Aircraft. Bernhard H. and Urban H. Gudori, Dayton, Ohio. (1,923,973)

Gyroscopic navigational instrument. James B. Henderson, Blackheath, England. (1,924,037)

Airplane. Paul Mosimann, Utzenstorf, Switzerland. (1,924,049)

Automatic variable-pitch propeller. Chandley W. Lambert, Cleveland, Ohio. (1,924,061)

Airplane. Lester L. Jones, Oradell, N. J. (1,924,122)

Aircraft. Frederick A. Kusse, Chicago, Ill. (1,924,192)

Adjustable-pitch propeller. Frederick Charavay, Piqua, Ohio. (1,924,349)

Aviation instruction apparatus. William H. Ball, Chicago, and James R. Ball, La Grange, Ill. (1,924,390)

Attachment for aircraft propellers. Helmer Schanke, Blue Earth, Minn. (1,924,461)

Airplane. Lewis J. Tetlow, Holyoke, Mass. (1,924,471)

Aircraft. Otto Richter, Gary, Ind. (1,924,651)

Gyroscopic compass. Herman Anschutz-Kaempfe, Munich, Germany. (1,924,688)

Tailless airplane. Wilhelm Langguth, Boblingen, Germany (1,924,996)

Retractable landing gear. Robert W. Ayer and Charles R. Irvine, Wayne, Mich., assignors to Manning & Co., Chicago, Ill. (1,925,080)

Aircraft. Charles P. Burgess, Bethesda, Md. (1,925,133)

Gyroscopic compass. George L. Dillman, San Francisco, Calif. (1,925,138)

Method and apparatus for airplanes. William M. Fellers, Washington, D. C. (1,925,139)

Method of driving propellers and rotative wing systems. Sidney P. Vaughn, Ackerman, Miss., Lieutenant Commander, U. S. Navy. (1,925,156)

Air mail bag transfer. Lawrence Beesley and Charles C. Williams, Provo, Utah. (1,925,171)

Means for facilitating the taking off and landing of aircraft and the refueling of them. Theodore E. Steiber, Bridgeport, Conn. (1,925,212)

Automatic fire extinguisher for airplanes. John J. Gabbets, Alberta, Canada. (1,925,242)

Means for double transfer of cargo in aerial navigation. Frank F. Bradshaw, Oxford, N. C. (1,925,555)

Combined helicopter and airplane. Anthony V. Santarsiero, Bronx, N. Y. (1,925,609)

Means for launching aircraft. Robert H. Mayo, London, England. (1,925,768)

Method of making propeller blades. John Squires, Hagerstown, Md. (1,925,854)

Drift indicator for aircraft. John M. Duniea, Los Angeles, Calif. (1,926,583.)

Cylinder construction for aircraft engines. Andrew V. D. Willgoos, West Hartford, Conn., assignor to Pratt & Whitney Aircraft Corp. (1,926,736.)

High flight airplane. Nemorin L. Causan, Suresnes, France. (1,926,968.)

Method of making propeller blades. John Squires, Hagerstown, Md. (1,927,247.)

Aircraft. Ernest W. Dichman, Farmingdale, N. Y. (1,927,309.)

Airplane. Lewis J. Tetlow, Holyoke, Mass. (1,927,352.)

Brake control for airplanes. Louis Breguet, Paris, France. (1,927,358.)

Aircraft, Aircraft control, Aircraft sustaining system and propulsion, Sustaining and control surface. Edward F. Zaparka, New York, N. Y., assignor to Zap Development Corp. (1,927,535—1,927,537—1,927,536 and 1,927,538.)

Propeller. Ernest W. Caywood, Bartlesville, Okla. (1,927,919.)

THE NORTHROP DELTA

(Continued from page 29)

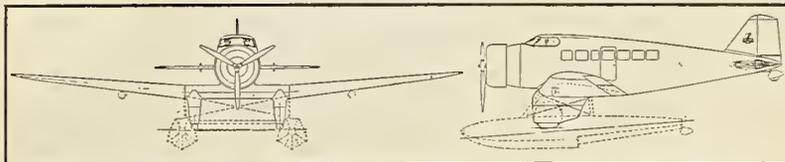
to exceed 10 pounds); two three-minute electrical flares.

Electrical equipment: Exide battery; Eclipse engine-driven generator; two S & M retractable landing lights; navigation lights; instrument lights; cabin dome light with switch; cargo compartment light; eight cabin lights each with switch; Scintilla magneto switch.

Power plant equipment: Hamilton Standard adjustable pitch propeller; Romec fuel pump; Lunkenheimer engine primer; exhaust collector ring with carburetor air preheater; oil cooler with by-pass valve; Eclipse hand and direct electric starter; starter hand crank.

Specifications

Wing span	48 feet
Chord at root	114 inches
Chord at tip	64 inches
Mean aerodynamic chord	99½ inches
Length	32 feet 5 inches
Wing area incl. ailerons	363 square feet
Aileron area	21 square feet
Stabilizer area	37.4 square feet
Elevator area	19.4 square feet
Rudder area	11 square feet
Fin area	9 square feet
Angle of incidence	2½ degrees
Dihedral (upper surface)	4 degrees
Weight empty	3600 pounds
Weight of equipment and radio ..	500 pounds
Useful load	2900 pounds
Total weight	7000 pounds
Gross wing loading	19.2 lbs. per sq. ft.
Gross power loading	9.8 lbs. per H. P.
Total gasoline capacity	340 gallons
Total oil capacity	20 gallons
High speed at 8,000 ft.	221 m.p.h.
Cruising (75% power) at 8,000 ft.	201 m.p.h.
Cruising (75% power) at 12,700 ft.	212 m.p.h.
Cruising (62.5% power), 15,000 ft.	200 m.p.h.
Landing speed, full load	58 m.p.h.
Landing speed, normal load	48 m.p.h.
Gliding angle, without flaps	15 to 1
Gliding angle, with flaps	5 to 1
Take-off run, flaps up	750 feet
Take-off run, flaps down	565 feet
Climb at sea level	820 feet per minute
Climb at 8000 feet	1000 feet per minute
Service ceiling	24,800 feet
Absolute ceiling	26,800 feet
Cruising radius at 15,000 ft.	1790 miles



Outlines of the Northrop Delta, showing wheel gear and alternate float installation

NEW EQUIPMENT and METHODS .

Improved Handy Floodlights

• SEVERAL IMPROVEMENTS in its line of Handy Floodlights have been made by the General Electric Company. In its exposition model, designed and used at A Century of Progress, an adjustable socket support was furnished to accommodate both 500- and 1000-watt general service incandescent lamps. When the socket is fully in, the 1000-watt lamp is in focus; when the socket is fully out, the 500-watt lamp is in focus. A 1500-watt hard glass lamp can be used with the projector, provided the lens is removed. Other changes include a slightly increased gauge of the aluminum casing, and the use of a substantial hexagonal nut to give positive clamping to the mounting.

The Junior and Senior floodlights have been changed and provided with a velvet finished reflector, providing a greater reflecting surface and a more even diffusion of light. Spike mountings are now provided with standard bases in all models for use in temporary mountings.

Explosion Proof Gas Pump Motors

• EXPLOSION PROOF filling station gasoline pump motors, available in split phase, repulsion start single phase and direct current types, have been developed by Century Electric Co., St. Louis, Mo.

The frame is of rolled steel with cast iron end brackets. There are no re-

movable plugs or caps and the bearing brackets are held in place by four holding bolts through holes outside the closure. The switch shaft and motor shaft bearing housings are both flanged and drained to prevent seepage of gasoline into the switch closure along the switch shaft or the oil well along the motor shaft.

The switch, actuated from the nozzle hook, is a double pole circuit breaker provided with thermal overload protection that trips free and cannot be held closed under sustained overload, which is reset from the nozzle hook. The switch is completely enclosed inside the end bracket.

Photoelectric Relay Controls Airway Lights

• USE OF the Visitron F2 photoelectric cell has enabled G-M Laboratories, Inc., of Chicago to market a new photoelectric relay which, it is felt, will be of importance in controlling lighthouse beacons, obstruction lights, airway beacons and other lights, particularly where they are used in locations not served by electric power lines. The Visitron cell requires no external voltage and no amplification.

The complete unit, designated as the FSE photoelectric relay, incorporates, in addition to the Visitron F2 cell, a sensitive relay and an auxiliary electro-magnetic relay housed in a small compact aluminum case.

Stainless Clad Steel Developed

• THE DEVELOPMENT of stainless clad steel offers several possibilities for application to airplane construction that are attractive on account of the material's resistance to corrosion and moderate cost.

Stainless clad steel is a two-ply metal having a thin surface of true stainless steel bonded to a foundation of mild steel. The stainless steel surfaces usually comprise 20 per cent of the total thickness of the sheet. This composite metal, known as IngOclad, was developed by the Ingersoll Steel & Disc Co., a division of the Borg-Warner Corp., Chicago, and has been applied in many cases where beauty of finish and non-corrosiveness were guiding factors in the selection of the material.

In airplane construction the metal (which is available in thicknesses ranging from the very light gauge sheets to plates 1½ inches or more thick) is adaptable for instrument boards, decorative trim, drip pans, and offers possibilities for tank and pontoon construction and outer sheathing.

IngOclad welds and fabricates easily. The patented method of producing this clad material assures a perfect bond between the stainless and mild steel plys, so that they cannot become separated.

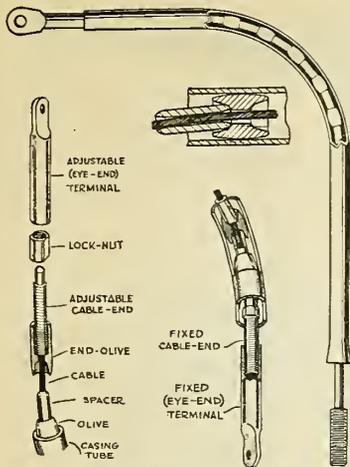
Solvent Metal Cleaning

• A COMPOUND solvent for use in the Rex Solvent Machines is being manufactured by Rex Products & Manufacturing Co., Detroit, Mich. The material, known as Perm-A-Clor, is said to contain more effective wetting and dissolving properties than benzene, naphtha or other solvents which cannot be safely heated or boiled. In removing oil, waxes, drawing compounds, buffing compounds, etc., the solvent is used in the machines by heating with steam, gas or electricity. The resulting vapors are condensed within the machine by means of a water jacket, and the resulting condensate is returned to the heating compartment after filling and overflowing the rinse compartment or passing over the work, according to the type of machine being used.

It is claimed the solvent method is most suitable for cleaning zinc or other coated metals, aluminum, die castings, copper or brass parts, motor parts, stampings, bolts and nuts, hardwood, etc. It is beneficial before painting, enameling, lacquering, plating, bonderizing, or for close inspection.



These instruments insure radio accuracy at TWA's Kansas City base



Cross-sections of Simmonds control system

Control System Device

• BREWSTER AERONAUTICAL Corp., Long Island City, N. Y., has developed for use in this country the Simmonds-Brewster Control System, a device to transmit push or pull through a small tube, displacing push rods, bell cranks and the double cable and pulley system. This type of control has been used since 1931 in Great Britain and in Continental Europe.

The principle of the system is found in a series of short, hollow columns (olives and spacers) with ball and socket ends, threaded on a flexible cable, the whole being encased in a duralumin tube. Under compression the units are restrained from buckling at the joints by the confining walls of the tube, while in tension, the cable takes the load. Terminals to hook-up with moving members screw on to cable-ends sweated to the cable. One terminal has an adjustable lock-nut to take up wear, while the other is fixed.

The control is made in two sizes, operating in casing tubes of 5/16" and 7/16" outside diameter, respectively. The smaller size is used for subsidiary controls to the engine, brakes, adjustable propellers, flare or bomb releases, dump valves, air shutters, landing lights and "tab" controls and is rated at 200 lbs. in tension or compression. The larger size is used for flying controls and other loads running up to 760 lbs. maximum. Both sizes were approved recently by the Aeronautics Branch of the Department of Commerce.

The casing tube may be bent in any number of curves, the ball and socket ended units swinging into the necessary curvature; it may be bent around corners or led through any complicated structure. Friction is said to be exceedingly low, due to the small area of the sliding sur-

face in contact. Adjustment permits reduction of backlash to a minimum.

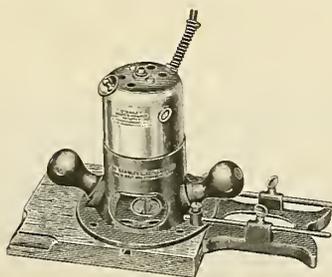
Two-Way Telephone Communications

• ACCURACY WHICH permits variations of only one oscillation in five million is insisted upon in tuning the radio transmitters and receivers of the airlines' radio stations and on the planes. To accomplish this, the radio laboratory of Transcontinental & Western Air, Inc., in Kansas City, has been instrumental in designing various instruments to give accuracy at all times. In the photograph on page 32 the tall cabinet in the center is a frequency standard, containing a multivibrator, whose primary working part is a quartz bar. The mechanical oscillations of this bar are constant to one part in five million and the instrument multiplies and divides, in terms of electrical oscillations, simultaneously and with absolute accuracy. The instrument is used in checking the frequencies of the various ground stations and plane transmitters to maintain accurate frequency. The other instruments are a multimeter tube and receiver checker; a standard signal generator which gives out signals identical in effect to radio signals; the frequency standard; receivers used in connection with the frequency standard; a noise meter for checking the strength of radio signals and other noises about an airplane such as the hum of the motor.

Remote Control Unit For Aircraft Radio

• ELIMINATION of the effect of backlash is claimed for the new remote control mechanism developed by Westport Manufacturing Co. of Glendale, Calif., for use in its 6-tube tuned radio frequency aircraft radio receiver which operates over a frequency range of 200 to 525 kilocycles.

As standard equipment for the receiver, the new unit employs reduction gears at both ends of the control cable reducing backlash to an imperceptible amount.



Stanley hand router

Router and Shaper

• MODERATE PRICED electric routers and shapers have been announced by Stanley Electric Tool Co., of New Britain, Conn., featuring an interchangeable power unit which enables the purchase of either a Hand Router, Bench Router or Bench Shaper and the later addition of other units.

The 110-volt motor unit is of special design with provision for mounting either a router chuck or a shaper spindle directly on the armature, thus eliminating belts, pulleys and vibration.

The Shaper unit has a patented tilting motor unit holder which not only makes possible the use of small diameter cutters for all molding cuts, but also allows the cutting of almost any contour with a limited number of cutters. Such operations as corner beading, fluting, dovetailing, inlaying, etc., are possible with these units. An interesting and illustrative instruction book has been issued in conjunction with these tools by the Stanley company.

New Gasket Paste Marketed

• A NEW product which should be of interest to all engine manufacturers, rebuilders and service organizations is the gasket paste being manufactured and sold by the P. O. B. Manufacturing Co., Inc., of Cincinnati, O. The manufacturer claims positive sealing qualities; instant setting and non-hardening; resistance of heat up to 400 degrees Fahrenheit; leak and pressure proof with non-soluble qualities defying steam, gasoline, freezing; and usable for radiator hose connections, bolts, pipe threads, steam line joints, etc.

The material is available in 3 oz., 8 oz. and 4 pound sizes. Samples will be sent upon request to the manufacturer.

Westinghouse Fluid Valve

• THE FLUID Valve is an electrically operated check valve recently developed by Westinghouse engineers for handling both small and large volumes of compressed air and liquid mediums, including gasoline, water, oil and gas. It can be inserted in oil or gasoline lines. For example, it has been suggested that the small valve be inserted in the gasoline line of a plane immediately in front of the gas tank in the wing. The idea is that the coil of the valve can be interconnected in the ignition circuit in such a way that cutting off the ignition switch will close the valve, thus cutting off the gasoline supply to the motor at the tank.

Personalities



by Caldwell

• AS THE Deep Rock Oil Corporation announces the establishment of an Aviation Sales Division headed by Farr Nutter, it occurs to me that now would be an ideal time to introduce Brother Nutter to the six amiable readers of this department. It was on August 2, 1891, that Farr Nutter was born on Cabin Run near Toll Gate, West Virginia. I've just looked the place up in my geography; I've found West Virginia, but hanged if I can find Cabin Run or even Toll Gate. Farr says that it was a place in the woods, entirely surrounded by woods, and that his home was a pioneer log cabin, heated by a huge open fireplace which consumed wood like a blast furnace with all drafts open. When the wood supply was diminished the head man would look straight at Farr, and the lad would have to leap outdoors and cut down another tree. By 1906 he had deforested a considerable part of this section of West Virginia, and still the cabin wasn't what you'd call hot on cold nights.

Years ago I spent two winter weeks in Northern Vermont in what was sarcastically known as a hunting lodge, because we spent most of our time hunting wood with which to feed a vast fireplace that would have defied the efforts of a freight locomotive's automatic stoker. I know what Nutter was up against with the pioneer paternal heating system. We would build a roaring fire, and in an hour it would be ashes, and the hunting lodge would be so cold that the only way we could get warm again would be to go out and cut more wood.

By 1906 Farr gave up the unequal contest and emigrated to the city where wood chopping was unknown. He had graduated from the District School, where he had learned to read and thus fell an easy victim to one of the Navy's recruiting posters telling young men to join up and see the world as a guest of the taxpayers. It was one of those romantic lithographs with a destroyer in the foreground and palm trees full of coconuts in the background, and the sea between filled with Hawaiians on surfboards. They never use pictures of sailors shoveling coal or polishing brass or scrubbing decks, so Farr signed up in 1910 for four years, during which he learned enough to avoid the billows and baked beans thereafter. He applied for a transfer to the air service, but his com-

manding officer informed him that he was not the right type to be an aviator. So he got out of the Navy and went to Hammondsport, N. Y., to take flying instructions. But the school had been transferred to San Diego, Cal., for the winter, so the ex-gob took a job in the assembly department of Glenn Curtiss' factory, and on the side got about two hours' dual instruction from Baxter Adams. But he didn't get anywhere until 1917, when we got involved in a European war in which the United States had absolutely no business.

That war was a great help to youths with air yearnings. Nutter was ap-



Farr Nutter

pointed a cadet in the U. S. School of Military Aeronautics at Cornell University, Ithaca, N. Y., then sent to Ellington Field, Houston, Texas, for flight training. May, 1918, he was commissioned 2nd Lieut., U. S. Air Service, and assigned to duty as instructor in acrobatic flying at Ellington. In October, 1918, he was transferred to Carlstrom Field, Arcadia, Florida, for pursuit training, when somebody up and stopped the war, so he didn't have to pursue anyone. It must be rather embarrassing to spend a year and a half training and be all dressed up to fight—and then run out of wars to go to.

Nutter was discharged from the Service in January, 1919, and soon began to hang around the Air Mail hangar in

Woodland Hills Park at Cleveland, Ohio. He had a great urge to fly again, and needed a job, so asked Colonel Jordan, General Superintendent, for a place. There were only 500 applicants ahead of him in Washington when he filed his formal application, so you see what a swell chance he had of joining the Post Office Department.

At that time the western terminal of the Air Mail was at Grant Park, Chicago. The pilots were Paul Oaks, C. Leonhardt, Max Miller, Randolph Page, E. Hamilton Lee, Jack Knight, and Lester Bishop. Three days after learning that he was number 501 on the application list, Nutter visited the Cleveland field. A DH was standing there fully serviced, mail loaded, mechanics standing by—and no pilot in sight. The bold Nutter dashed in to the office and braced Colonel Jordan for a job. A pilot was coming by train, said the Colonel, fresh from Randy Page's testing school at Washington. But when he arrived in Cleveland the pilot declared that he didn't have enough DH time to fly all the way to Chicago; he wanted some practice around the field first. That left the DH and the mail still standing on the field, short one pilot. Meanwhile the anxious Nutter was proclaiming loudly that he was an expert with a DH, and that the mail should go. Finally, when it got to a time when the ship either had to go or default the schedule, the Colonel and his Division Manager, McCandless, decided to take a desperate chance. They explained that they had only that one ship on the Division, and that if it was washed out operations would be considerably curtailed, not to say stymied completely. "Take it," they said, "and for God's sake don't crack that ship!"

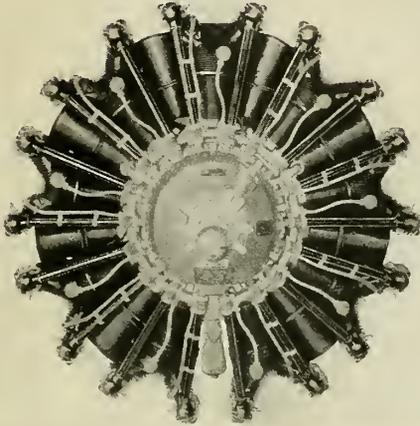
Nutter had no flying equipment with him, but turned his cap around, put on a pair of sun spectacles, and took off. The thrill of the powerful Liberty engine was one of the greatest he had experienced up to that time; for despite his protestations about his skill with a DH, he'd never been in one before, as he was a pursuit pilot. After he got into the air he found out two things: he had no map, and he had forgotten to ask where this mail was to be delivered. Of course, it was for New York or Chicago—but which place? He couldn't

(Continued on following page)

POWER

...at High Altitudes

710 H.P. AT 7000 FT.



735 H.P. AT 4000 FT.

715 H.P. AT SEA LEVEL

The Wright Cyclone produces higher power outputs at higher altitudes than any other radial, air-cooled engine in established service operation

THE Wright (Series F) Cyclone is the most powerful radial, air-cooled engine in established service operation—at sea level or supercharged for performance at high altitudes. Approved Type Certificates have been granted by the U. S. Department of Commerce for the following ratings at full throttle operation at sea level—

715 h.p. with fuel of 87 octane number
675 h.p. with fuel of 80 octane number
645 h.p. with fuel of 73 octane number

The U. S. Department of Commerce has also granted the Cyclone the following approved ratings for high altitude performance—so essential in modern military maneuvers and in some classes of commercial service—

710 h.p. at 7,000 feet with fuel of 87 octane number
735 h.p. at 4,000 feet with fuel of 87 octane number
670 h.p. at 2,500 feet with fuel of 80 octane number
620 h.p. at 4,500 feet with fuel of 73 octane number

This range of power at high altitudes is not approached by that of any other service-proved radial, air-cooled engine built today on a production basis.



WRIGHT
AERONAUTICAL CORPORATION
PATERSON NEW JERSEY

A DIVISION OF CURTISS-WRIGHT CORPORATION



(Continued from preceding page)

recall anyone having told him where to fly that mail; and they had probably taken it for granted that he knew where it was to go. Nutter was afraid to land and ask, for he figured that a pilot's taking off without even knowing where he was going would be enough to unsettle Colonel Jordan's confidence in him. He was up, he was working for the Post Office Department, at least until he landed, so he decided to land at any field except the one he had just left. They couldn't fire him until he had made one trip, even if it was in the wrong direction.

Now it happened that he had a New York Central R. R. time-table in his pocket; and in it was a small map, with the railroad very black and straight, and the surrounding territory rather out of scale. But it had the Great Lakes, and there was Lake Erie itself to his right. He happened to be headed west at the moment, and it seemed from the map that Chicago would be easier to find than New York—the black line of the tracks ran straight to Chicago, but on the map to New York they went up around Buffalo and Albany. So only because it looked easier to find Chicago, he took his load of mail in that general direction. It was the longest cross-country flight he had attempted up to that time, and he was thrilled at the sheer adventure of it all. Although his ideas of navigation were hazy, he knew that Chicago was west, and he had a compass that pointed west when it settled down after swinging to every other point; and down there were the railroad tracks, older transportation's gift to the uncertain airman.

It was a glorious late autumn afternoon, and the new courier of the skies was having a swell time until it began to get dark without any Lake Michigan in sight, yet he'd been flying long enough to get there. He also noticed that he had run out of railroad; somewhere back he had inadvertently left it and was sailing along over the flat fields of one of the 48 states—perhaps Indiana. He decided that he must have drifted south, so turned due north and after ten minutes' flying found himself over Gary, Indiana, with Lake Michigan just ahead. Briefly thanking Providence for this favor, he flew along the lake to find Grant Park, and landed safely if a trifle wildly. He turned to taxi to the hangar—and the engine stopped. He had run out of gas! His luck held even longer, for that load of mail actually was for Chicago. Thus he made good with the Air Mail.

In February, 1920, he and Walter J. Smith opened the Chicago-Omaha Division. Nutter was the first pilot to fly mail out of Omaha for the East. In November, 1920, Col. Jordan had extended Air Mail service to San Francisco, and Nutter was transferred there

to fly the Sierra Division. On February 22, 1921, arrangements having been made for a continuous transcontinental flight from San Francisco to New York, Nutter was designated to fly the first section of this historic beginning of our transcontinental Air Mail service. He started at 4 a.m. making what was probably the first night flight over the Sierra Nevada Range.

He resigned from the Air Mail and entered commercial aviation, then the advertising business, and later became Assistant Sales Manager of the Great Lakes Aircraft Corporation. From there he went to American Cirrus Engine Company as Sales Director, and in October of this year joined the Deep Rock Oil Corporation to establish their Aviation Sales Division, organized to facilitate the handling of Deep Rock's increasing sales to aircraft service hangars and transport operators, which began in 1930 when the Hunter Brothers established their World's Record Endurance Flight with Deep Rock oil and gasoline. The Corporation is a large producer and refiner of Mid Continent Crude with distributing facilities throughout the West and Midwest States. Farr Nutter will be glad to hear from his old friends at the General Offices of the Corporation, 155 North Clark St., Chicago. If he has as much luck in the oil business as he had on his first Air Mail flight, he is in for a brilliant career.



• **JERRY WESSLING**, professional parachute jumper and licensed rigger, of Toledo, Ohio, takes me to task for not writing about parachute jumping. Well, the only reason I haven't is because I don't know much about it. But Joe Crane, the noted jumper of Roosevelt Field, and I are getting together on an article about parachutes and parachuters, which we'll run soon. I think we ought to make it a parachute number of *AERO DIGEST*, for we haven't devoted much space to this very important phase of aviation. After all, getting down is just as important as getting up; and if an airplane passes in its checks in the air, the parachute becomes just about the most important thing in the world to the gentlemen who have been aviating. I sat on a parachute myself for nearly three

years while I was testing some of the early mistakes made for the United States Navy; and while I never had to jump, it was comforting to know that the Irvin Air Chute makers had supplied me with an extra chance for survival, no matter what the merry designers did to me inadvertently.

Jerry Wessling, who is now twenty-one, a most happy and care-free age, started jumping at the age of fifteen while he was still in school. He used to raise his hand every time he wanted to leave the room or the ship. Up to Oct. 20, 1933, he had raised his hand and left the airplane 305 times, which is quite a few jumps and enough to wear callouses on the three points of the anatomy on which parachute jumpers land. The heels are the other two points.

Jerry has jumped about every type of chute made. He has made night jumps with flares and hot shot batteries, jumped into lakes with parachutes, and made every other kind of jump that he or a promoter could think of in thirty-three states. And he's never had a serious accident, and never been without bumps and bruises, which are a standard part of every jumper's equipment. Contrary to general belief, parachutes do not deposit their precious burdens like someone placing an egg on a table; they drop him down like someone else chucking a sack of flour in a corner, especially if he isn't snappy about his landing.

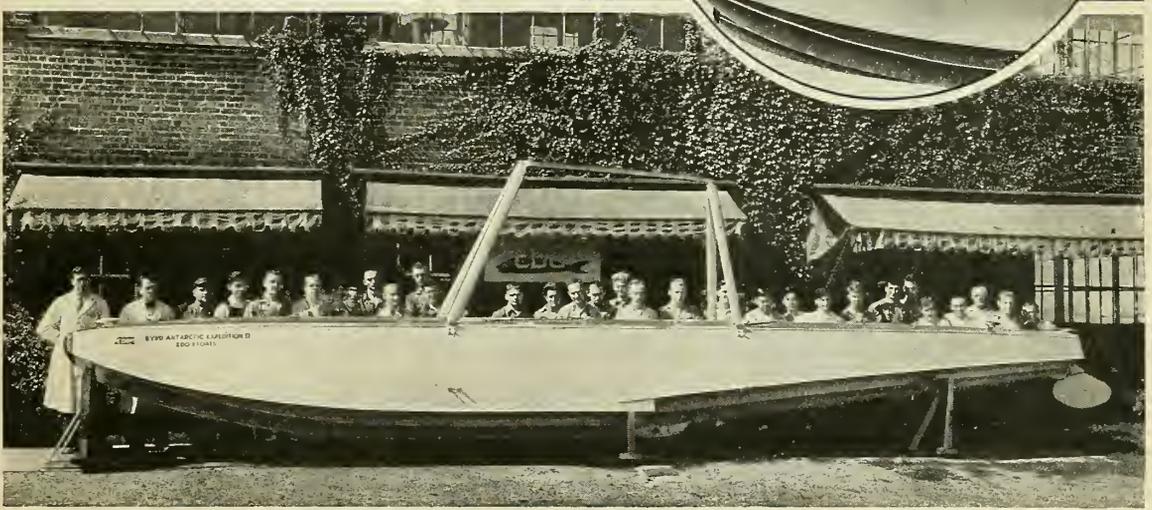
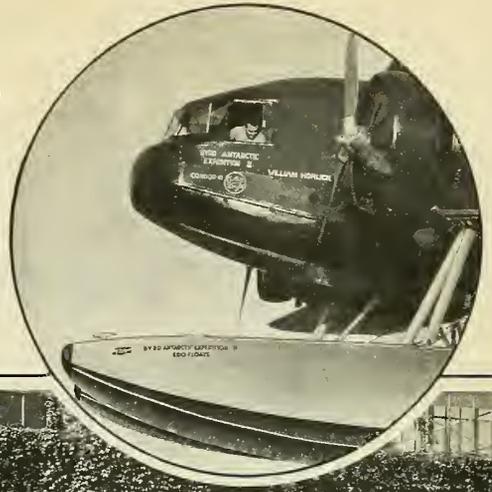
On the Cord Cup Race last year Jerry Wessling was picked by the Henderson brothers as official jumper, together with the late Spud Manning and Roger Don Rae. He has competed in most of the air meets and races all over the United States in the last three years, from Los Angeles to Miami, and New York to New Orleans. Any place where the boys are dropping, Jerry goes along and drops too, so they won't be lonely. He placed two firsts, two seconds, a third, a fourth and two fifth places at the National Air Races at Cleveland in 1932; and he won every first place in jumping contests at the National Air Races at Los Angeles this year. These five first places gave him the sweepstake award; but he points out to me that neither Roger Don Rae nor Joe Crane were competing there, which is fair of him. Roger and Joe are tough competition for any jumper trying to hit the spot.

Jerry also won three firsts and a fourth place at the International Air Races at Chicago this year, again winning the sweepstakes. He is now beginning to specialize in delayed drops from 10,000 feet, which I believe Spud Manning originated. Anyhow, Spud was the first I saw do them. Jerry packs about 150 parachutes a year. His jumping is a profitable business, but he considers it merely thrilling diversion and the greatest sport in the world.



Jerry Wessling

A Giant Seaplane Goes South with Byrd . . .



. . . on Floats

EDO is justly proud of its part in supplying the seaplane gear for Admiral Byrd's Curtiss-Wright Condor. Largest in the United States, these giant 32-ft. floats have been chosen to shoulder the burden of an overload take-off from the Antarctic Ocean and the shock of landing their keels on the snow and ice of Little America.

The spectacular nature of the Antarctic flight serves but to emphasize further the practical advantages of large seaplanes for

heavy transport duty. The Condor seaplane, for instance, carries its passengers high above sea and spray, isolated and insulated from the shock of waves, protected from accident by 22 water-tight compartments in the pontoon structure. The 25-degree fluted bottoms of the EDO Floats insure against rough and labored take-offs; the retractible water rudders give superior ease in handling.

EDO-equipped seaplanes, in many sizes up to the huge Condor, are now available for transport service, and are convertible for land or sea duty. For information, address EDO AIRCRAFT CORPORATION, 610 Second Street, College Point, L. I., N. Y.

Condor: Seaplane Data: Gross wgt., 17,800 lbs.; useful load, 5,800 lbs. (ratio 32½%); 15 passengers; crew of 2; cruises 125 m.p.h.; top speed, 150 m.p.h.; full load climb, 750' per min.; full load take-off, 18 to 24 sec.



EDO FLOATS

AIRLINES and AIR TRAVEL

President Signs Transport Code

THE AIR TRANSPORT code, fixing minimum wages and maximum hours for all wage-earners, with the exception of employees on maintenance and emergency work, was signed by President Roosevelt.

The code provides for a minimum wage of \$15 a week and a minimum hour schedule of 40 hours a week, except as follows:

Shop mechanics and shop mechanics' helpers not more than 40 hours per week averaged over a period of four weeks, with a maximum of 48 hours in any one week.

Service mechanics and service mechanics' helpers, not more than 48 hours a week, averaged over a period of eight weeks, with a maximum of not more than 54 hours in any one week.

Ground radio operators and field clerks, not more than 48 hours in any one week; watchmen, not more than 54 hours in one week; chauffeurs not more than 48 hours in any one week averaged over a period of six weeks, with a maximum of 54 hours in any one week.

Pilots were excluded from the code at their request made during the public hearings on the code.

According to the Aeronautical Chamber of Commerce, an increase of 16 per cent in personnel and a 20 per cent raise in payroll of the industry will result from signing the code

56,830 Passengers Carried

SCHEDULED AIR transport lines operating in the United States carried 56,830 passengers in September, 1933, according to Eugene L. Vidal, Director of Aeronautics, who received reports

from 24 of the 25 lines operating during the month.

These lines flew 4,439,453 miles, carried 130,635 pounds of express and flew 21,515,361 passenger miles during September. The September 1932 figure for passengers transported was 4,001 less than those for this year.

BILLINGS-SPOKANE LINE OPENED

DAILY SERVICE, excepting Saturdays and Sundays, is now being maintained between Spokane, Wash., and Billings, Mont., following extension of its line by Northwest Airways, Inc., on Oct. 23. According to Croil Hunter, vice-president and general manager, the present trip requires about six hours, but with the addition of new high-speed Lockheed Electras in the near future, the time is to be considerably lowered, possibly to three and a half hours.

Three Bid for Mail Line

THE POST OFFICE Department received three bids for the air mail service between New Orleans and the quarantine station at Pillottown, La., when the deadline for proposals was reached November 15.

Those bidding were Tropical Airways, New Orleans, \$48 per round trip; Fogg-Farnsworth Flying Service, Boston, \$65, and Johnson Airways, Inc., New Orleans, \$70.

American Airways Opens New Building

A NOTABLE gathering came to Fort Worth, Tex., on October 18 to witness and be present at the dedication of the new \$150,000 Southern Division Headquarters building of American Airways.

The building and hangar is constructed of light gray brick and is 220 feet long and 140 feet wide, providing accommodations for 15 or more transport planes. Two hundred mechanics and machinists work in the building, which includes a repair shop, sand blast and oil reclaiming unit, stock rooms and testing stands.

American Airways now has 16 ships operating in and out of Fort Worth daily, with the new Lockheed Orions and Curtiss Condors replacing the previous equipment and flying over the Los Angeles-Cleveland route.

Among those at the dedicatory exercises were Vice-President John N. Garner; Postmaster General Farley; Eugene L. Vidal, Director of Aeronautics; Maj. J. Carroll Cone, Director of Air Regulation Division; Silliman Evans, Fourth Assistant Postmaster General; L. B. Manning, chairman of the board of American Airways and president of the Aviation Corp.; W. H. Howes, Second Assistant Postmaster General; Frank Hawks and Emil Hurja, executive assistant to the Secretary of the Interior.

Amon Carter, local newspaper man, who was instrumental in having the officials at the exercises, entertained 400 guests at Shady Oaks where the dedication was completed.

Boeing Takes Over Route

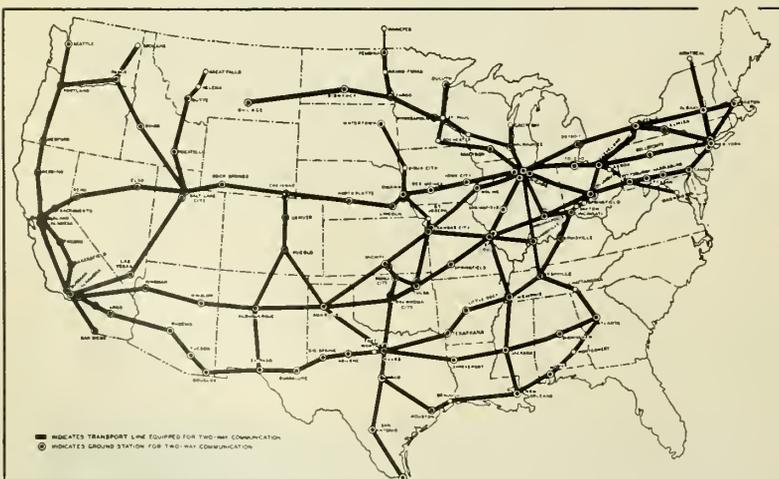
OPERATION OF the Portland-Salt Lake City route of United Air Lines, formerly handled by the Varney Air Lines division of the company, was taken over by the Boeing Air Transport division, following sub-lease of the contract.

Another station has been added to the Pacific Air Transport division by the establishment of a refueling base and radio station at Eugene, Ore., on the Seattle-San Diego airway. Herman Hobi is representing the company at Eugene.

Short Line Begins Operations

LICON AIRWAYS, Inc., of Islip, N. Y., a newly organized transport company, has inaugurated airline service between Islip, Roosevelt Field, New Haven and Bridgeport, Conn., on a twice-daily round-trip schedule. Approval by the Airways Section of the Department of Commerce has been granted and operations are conducted in six-place Travel Air monoplanes.

(Continued on following page)



Airlines provided with Western Electric two-way radio equipment

Every day...

47,600 MILES!



Dawn to dusk, dusk to dawn, sixty of the new Boeing 247 transports carry their loads of mail, passengers and express over the Coast-to-Coast and other routes of United Air Lines. Pioneers of the new era in high-speed, de luxe air transportation — surpassing every claim made for them—they have definitely proved themselves “tomorrow’s transports today.” Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



BOEING *has always built tomorrow's airplanes today!*

(Continued from preceding page)

High Speed Mail Line Opens

REDUCING TRAVEL time between Cleveland and Fort Worth and establishing the fastest air mail and express service in the country, two new high-speed schedules were put into service by American Airways. The mail-express run is flown in the new Lockheed Orions, reducing time between the two cities to seven and a half hours. In addition, the Lockheed service extends to Los Angeles, placing Fort Worth within 7 hours 40 minutes of the west coast terminal for mail and express.

New Curtiss Condors were also placed in service between Fort Worth and Cleveland, providing these cities with new and improved passenger facilities.

Plan Winter Traffic Drive

A CAMPAIGN to stimulate air traffic during the winter months was planned at an annual conference of district traffic managers of United Air Lines, who met at general headquarters in Chicago to attack the problem of educating the traveling public to the fact that air transportation is a year-'round form of transport.

Eleven district traffic managers met with General Traffic Manager K. A. Kennedy for four days, while matters pertaining to traffic promotion, sales and advertising plans were considered. They included: V. P. Conroy, New York; B. B. Gragg, Cleveland; Thos. Wolfe, Chicago; R. W. Knight, Kansas City; Wm. Philp, Dallas; H. W. Peterson, Omaha; Lee Jamison, Salt Lake City; R. F. Ahrens, Seattle; H. J. Merchant, Portland; S. A. Stimpson, San Francisco, and L. O. Kennedy, Los Angeles.

Three Cities Get Mail Service

THE POST Office Department announced the inclusion of additional cities on Western Air Express and American Airway's routes as stops for air mail service.

Elk City, Oklahoma, on the St. Louis-Amarillo route, CAM 34, became a stop on November 11. On the same day, Las

Vegas, N. Mex., was embraced for supply over CAM 12, while Meridian, Miss., was made a stop on CAM 33, November 18. Meridian is on the Birmingham-Jackson division and Las Vegas on the Trinidad-Santa Fe division.

American Airways operates CAM 33 and 34, while Western Air Express flies CAM 12.

PERFORMANCE RECORD

UNITED AIR Lines claimed a new performance record with the completion of 2,803,000 scheduled miles of flight in the last six months over its Chicago-California division. Of the 1,457 scheduled trips, 1,003 were finished on time or within 30 minutes of schedule.

Line Starts High-Speed Service

THE SAN FRANCISCO and Sacramento municipal airports are now connected by a new high-speed service operating by way of San Francisco Bay Airdrome, Alameda, Calif.

Capitol Speed Lines is flying a daily service consisting of three round trips with two Wasp-powered Lockheed Vegas formerly owned by the Air Express Corp. The planes, once built exclusively for express purposes, were completely overhauled and equipped for passenger service at the Lockheed Aircraft Corp., plant in Burbank, Calif.

Seek Houston-Waco Airway

THE AVIATION Department of the Houston, Tex., Chamber of Commerce is making efforts to secure the establishment of a federal airway from Houston to Waco, connecting there with the Fort Worth-Brownsville airway now in operation.

TWA Pilots Get Pay Increase

A REVISED scale of wages for Transcontinental & Western Air, Inc., pilots is now in effect, providing remuneration on a "base pay" and "hourly pay" basis, giving pilots who fly 80 hours a month an average annual income of \$7,000. Bonuses will be given for flying the new high-speed planes which soon will be in service.

Base pay is in the form of a salary, while hourly pay is based on the number of hours actually flown, graduating upward as the speed of the planes increases. A bonus of \$2.00 an hour is paid for each hour of night flying. Pilots in their first year of employment with the company will receive a base pay of \$1,600 annually, which is increased at the rate of \$200 a year to a maximum of \$3,000.

Seadrome Aid Discussed

ALTHOUGH REPORTS were circulated that the Public Works Administration had allocated funds for the study and experimental construction of a seadrome to be owned by the United States Government and established and operated by the Aeronautics Branch of the Department of Commerce, it is understood that as yet no definite acceptance of the Commerce Department's application for \$1,500,000 to carry on the work has been forthcoming.

The proposal, however, is being seriously considered, but nothing definite will be done until the legal phases of the project have been placed before the Department of State and Justice to solve the problem of international law believed to be involved. Secretary Ickes of the Interior said a number of questions were embraced, including defense of the seadromes in case of attack and legality of using public works funds outside the United States.

Secretary of Commerce Roper announced, originally, that before construction work on the proposed floating islands constituting a transoceanic airway is started, a one-fourth section of one platform will be built at a cost of \$1,500,000 and thoroughly service-tested before the commitment is made for a full unit estimated to cost about \$6,000,000. The Department made a thorough study of the entire proposition and found that it will assure efficient, safe, dependable and profitable 24-hour mail, passenger and express service between the principal cities of the Atlantic seaboard and western European capitals.

It is further understood that at present the application is still pending in a subcommittee.

Pan American Orders Fairchild's

CONTRACT FOR six amphibian, 10-place, high-speed airliners has been awarded to Fairchild Aviation Corp. by Pan American Airways, marking the advent of the manufacturing company into the amphibian transport plane field.

Purchase of these planes is in line with the announced development program of the airways company under which it is buying more equipment at this time to provide additional employment and to increase its operating efficiency. This order is the first equipment award under the development program and follows the contracts placed with other manufacturers for a new series of trans-Atlantic ships.

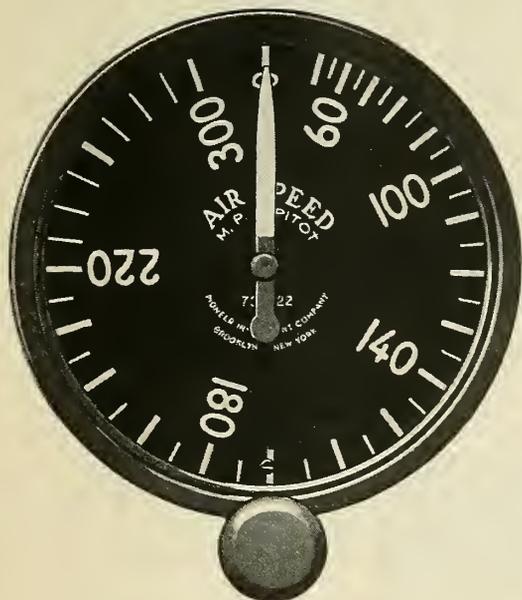
Airline Moves L. A. Base

AMERICAN AIRWAYS is now operating into and out of the Grand Central Air Terminal instead of United Airport, leaving the Burbank, Calif., field after doing business there for the past two years.



Pan American Airways' Fairchild amphibian

PIONEER ROTATABLE AIR SPEED INDICATOR and ELECTRICALLY HEATED PITOT STATIC TUBE



ROTATABLE AIR SPEED INDICATOR *Type 735* is an essential instrument, carefully designed to be quickly and easily read in conjunction with other instruments of the flight group. It is usually placed immediately to the left of the Turn Indicator...the Climb Indicator being placed on the opposite side.

The mechanism may be rotated so that when a pre-determined air speed has been attained, the pointer assumes a horizontal position on the right hand side of the dial...The Rotatable Airspeed Indicator employs the same high grade mechanism used in all standard Pioneer instruments. Available ranges, 200 to 300 MPH.



ELECTRICALLY HEATED PITOT STATIC TUBE, *Type 357D*... positively prevents ice formation at low temperatures, thus insuring operation of the Air Speed Indicator at all times...It is an established fact that within a certain low temperature range, ice will rapidly form on various parts of an airplane. The Pitot Static Tube, because of its small dimensions, may be rendered completely ineffective often before the airplane itself has been seriously affected by the ice load. Concurrently with this ice forming condition, low or zero visibility is usually encountered, making it necessary for the Pilot to depend entirely upon his instruments. The perfection of the Heated Pitot Static Tube makes possible reliable airspeed indication, regardless of temperature. To provide for various methods of mounting, Pitot Static Tubes, type 357D are offered in three models. All three models have the same Pitot Static section as illustrated above.

PIONEER INSTRUMENTS

PIONEER INSTRUMENT COMPANY INCORPORATED
BROOKLYN · NEW YORK · A SUBSIDIARY OF THE BENDIX AVIATION CORPORATION

AT THE AIRPORTS

County Airport Plan Halted

PENDING AN investigation as to whether a county airport could be made self-sustaining, officials of the Westchester County (N. Y.) Board of Supervisors have decided to delay, temporarily, making application for a loan from the Government for the work. Another barrier to the airport is seen in numerous complaints from residents in the vicinity of the proposed site who object to the field on the grounds that its activities will constitute a nuisance and a danger to them and their property.

A brighter outlook, however, is presented in the flood of resolutions and letters supporting the project. The Westchester Air Pilots Association, sponsors of the plan, presented 7,000 additional signatures of persons favoring it.

Air Associates Opens Branch

ANOTHER BRANCH has been added by Air Associates, Inc., with the opening of offices and a store at the Los Angeles airport in Glendale, Calif. According to Leroy Hill, president, this is the third link in the company's chain, the other branches being at Roosevelt Field and Chicago.

Ailor Sells Three More

WACO SALES of New York, Roosevelt Field, Mineola, N. Y., through Howard Ailor, president, announces the sale of three more Waco planes. Among the purchasers was P. E. Koster, who will take a Waco cabin plane back to Germany with him.

Planes were also purchased by J. Hildebrandt of New Jersey, who took a used Waco F, and to Capt. J. M. Patterson, publisher, who bought a cabin plane.

So far this year, Ailor has disposed of at least 35 new planes and an almost equal number of used models, the latter consisting of a large group of trade-ins.

Galveston Airport Lighted

THE MUNICIPAL airport at Galveston, Tex., is now completely lighted for night flying operations, following the installation of flood lights, boundary lights and other lighting equipment. The total cost of the installation was approximately \$7,500.

Upper New York Port to Build

FOLLOWING RECEIPT of information from Ewing Y. Mitchell, Assistant Secretary of Commerce, that in the relief funds that had been allocated the airways division, \$6,700 has been set aside in the total for Fort Plain, N. Y., use, work on the local airport is now expected to start very soon.

Situated midway between Schenectady

and Utica, the field will be one of the largest in that section of the state. The funds will be used for labor, trucking and grading, while equipment, formerly stored at the Stone Arabia or Big Nose field, will be brought to the new site.

ABILENE GETS AIA RATING

MANAGER L. E. Derryberry of the Abilene, Tex., municipal airport has been informed that his field has been awarded an A1A rating by the Department of Commerce. After the installation of night boundary lights on the east side of the field, E. Pendleton Tallaferro, of the airport section of the Department of Commerce, inspected the field and recommended the high rating.

Pond Appointed Operations Head

FOLLOWING THE resignation of R. C. Downing, Ozark Airways, Inc., of Springfield, Mo., Municipal Airport announced that Eugene Pond has been chosen to fill the position as operations manager. The company is leasor of the field and its president, George M. Prescott, is deputy commander of the NRA Volunteer Flying Corps serving under Dr. John D. Brock, national commander.

L. A. Port Gets New Road

WITH THE completion of the final link of Lincoln Boulevard in Venice, Calif., the Los Angeles Municipal Airport has been given a new direct highway contact with the cities of the north Santa Monica Bay Region and thence to the main Roosevelt Highway up the coast. The airport is now approached by five main traffic arteries, and a sixth direct main highway connection will be constructed just as soon as the State Highway Commission approves an expenditure for it.

Gooding, Idaho, to Get Field

A MUNICIPAL airport for Gooding, Idaho, is about to be built, following a visit of A. C. Blomgren, state aeronautics engineer, who approved the proposed site four miles south of the city. He recommended that adequate markings be placed there this year.

Love Field Hangar for Sale

THE ADMINISTRATION building and hangar owned by Dallas Airports Utilities Corp., has been offered for sale to the city. The building, located on Love Field, was erected several years ago at a cost of approximately \$100,000.

Ask Loan for Meacham Work

THE FEDERAL Government has been asked by the Fort Worth, Tex., City Council for a \$90,000 loan for the construction of a building at Meacham Field, municipal airport. Plans for the structure were drawn two years ago and subsequently approved by the Post Office Department, the Department of Commerce and various companies operating from the field.

The building would contain a post office, radio station, governmental offices, central ticket office, waiting room-lunch room, barber shop and quarters for airline companies other than American Airways which has an administration building on the field.

During the first nine months of 1933, the airport has handled 8,257 planes and 32,347 passengers.

In addition to the construction of the proposed building, the city has received bids for a new lighting system consisting of boundary lights, flood lights, traffic control lights and obstruction lights. The cost of this work has been estimated at \$37,000.

Kilgore Field Dedicated

ELDER'S FIELD, new municipal airport of Kilgore, Tex., was dedicated with impressive ceremonies sponsored by the local Chamber of Commerce. Among those at the exercises were James and Mae Haizlip, a squadron of Army planes and numerous other fliers. Bowen Air Lines and others operators in the vicinity, sent planes down for the opening exercises.

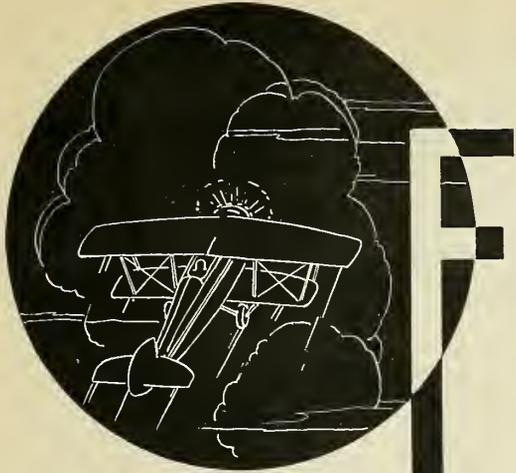
Trip Elder gave the city the land, 100 acres, one mile north of the city on the Longview-Kilgore highway. This was cleared and a small hangar built thereon. Many ships, owned by oil men and oil well supply companies, have been using the field for over two years, but dedication was postponed until recently.

Indianapolis Traffic Increases

AN INCREASE of almost nine per cent in the total number of transport and transient passengers using the Indianapolis, Ind., Municipal Airport is reported by Superintendent Charles E. Cox, Jr., for the first nine months of this year.

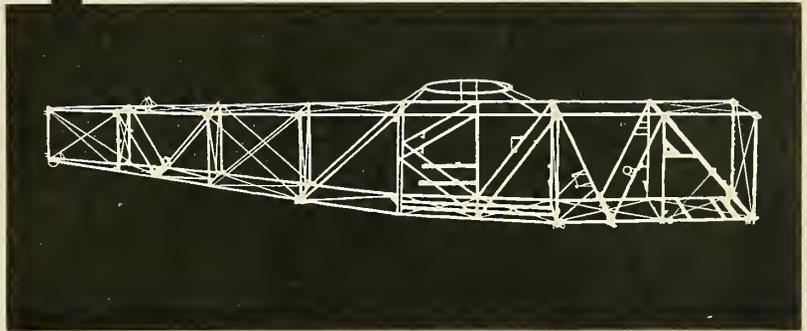
Passengers carried for 1932 (in parenthesis) and the first nine months of 1933, follow: transport and transient, 12,136 (11,223); military, 232 (1,225); students, 770 (899); miscellaneous, 1,490 (1,614).

Operations for 1932 and the first nine months of 1933 are: military planes, 241 (640); transient planes, 589 (783); student flights, 3,766 (3,402), and miscellaneous flights, 1,344 (1,072).



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THE AIR SERVICES

Macon in Action

FOLLOWING HER flight to the Pacific Coast dirigible base at Sunnyvale, Calif., the Navy dirigible *Macon* has had an active time. Admiral Standley revealed that all future use of the airship will be with a view of determining her military value.

The ship aided in celebrating Navy Day by soaring over the anchorage of the battle fleet and then completed a 2,500-mile cruise along the California coast. The ship spent 52 hours in the air, making a good part of the journey through fog.

Following a check by mechanics, the ship again took another cruise, this one of five hours duration, during which the apparatus for launching and hooking on airplanes in flight was tested. Admiral David Sellers, commander-in-chief of the United States fleet, was aboard during the last flight.

Further demonstrations of the value of the *Macon* will take place soon when it will participate in the war games of the combined fleets.

Marine Reserves Set Air Mark

MARINE SQUADRON VO-6-MR, reserve unit based at Floyd Bennett Field, Brooklyn, New York, is reported as having more flying hours to its credit than any other similar unit in the country. Recently, under the command of Capt. Stephen A. McClellan, it completed a two weeks active duty assignment during which it was called upon for many performances, including practice of tactical maneuvers, dive bombing, gunnery, radio, signal and ground signal "pick-ups."

The squadron is composed of 46 enlisted men and 14 flying officers with equipment consisting of nine observation planes, five training planes and one bomber.

Noel Davis Trophy Awarded

VN11RD9 SQUADRON, U. S. Naval Reserve Aviation, based at Wold Chamberlain municipal airport, Minneapolis, Minn., was awarded the Noel Davis Trophy for the fiscal year 1933. The presentation is made annually by the Navy Department to the most efficient aviation division of the naval reserve as a presentation of Harry F. Guggenheim.

More Airport Work Allotted

FUNDS ALLOTTED by the Public Works Administration are being used to advantage in repairing and improving army and navy posts and airports

throughout the country. The Quartermaster Corps has awarded contracts amounting to \$118,561.25 to Hensley Field, midway between Fort Worth and Dallas, for the construction of a lighting system, roads, hangar and aprons. The field is a Reserve Air Corps training base.

Other work contracts were allotted to contractors for Barksdale Field, La., and Post Field, Fort Sill, Okla.

SCHIFF TROPHY TO VO-7M

THE HERBERT SCHIFF Trophy, awarded annually to the naval aviation squadron compiling the greatest number of flying hours without serious accident to personnel or material, went to VO-Squadron 7M, east coast Expeditionary Force of Quantico, Va. The squadron, during the past competition year, which ended June 30, served six months in Nicaragua and six months with the Aircraft Squadrons at Quantico. In its equipment of Curtiss Helldivers and Vought Corsairs, the squadron flew 3,519 hours during the year without accident to personnel or material.

Scrapbook Aids Fliers

SO THAT pilots flying to strange airports may know something of the lay of the land, a large scrapbook is being compiled at Maxwell Field, Montgomery, Ala. Pictures taken at various angles of every large airport in the country are being inserted in the book, which already has a list of almost 50 airports in it.

Attack Group to Move in Spring

THE THIRD Attack Group will not be moved to its new flying base at Barksdale Field, Shreveport, La., until some time in the spring, according to Col. H. M. Hickam, group commander. The unit was supposed to have moved during November.

Let Work for Bolling Field

CONTRACT FOR grading, storm drainage, paving and seeding in the barracks area at Bolling Field, has been let to Corson & Gruman Co., of Washington, D. C. It amounted to \$103,600.

Another contract of \$458,070 for the construction of quarters for 39 company officers at Fort Humphreys, Va., went to the R. B. McDaniel Co., of New Brighton, Pa.

Naval Station Has Enlistments

PLANNING TO bring its organization up to full strength by January 1, the United States naval reserve aviation base at Anacostia has recruited 40 men as candidates for enlistments.

Candidates must first serve a three months probation, during which they receive instruction in regulations, close-order drill, manual of arms, signaling and first aid.

Weather Bureau Opened

THE NEW Eighth Corps Area meteorological station at Fort Sam Houston, supplanting the one that has been located for years at Kelly Field, is now operating under the supervision of Lieut. Col. Walter E. Prosser, signal officer for the area. Lieut. B. Stern is assistant signal officer, while an enlisted staff of five is headed by Sergeant J. S. Phillips, who was transferred from the Kelly Field station where he conducted a training school in connection with the station to qualify men for the work.

100-Plane Hangar Proposed

THE GOVERNMENT is planning to construct a 100-plane hangar at the Pensacola, Fla., Navy station situated about five miles from the city. It will house both land and seaplanes, many of which are used by cadets. Cost has been placed at about \$325,000.

A few years ago 19 unhangared service planes were destroyed by a hurricane which struck in the vicinity of Pensacola, and it is understood the new structure is being undertaken to forestall a recurrence of that incident.

Randolph Field Gets Chapel

CONSTRUCTION OF a \$52,700 chapel at Randolph Field, San Antonio, Tex., is now under way, following award of the work to Vincent Falbo & Sons, local contractors. The building will be Spanish in design and will measure 70 by 120 feet.

Minneapolis Reserve Flyers Active

FIFTEEN OFFICERS and 30 enlisted men participated in the annual cruise of Naval Reserve Aviation Squadron VN 11 RD9, which is based at the Wold Chamberlain municipal airport, Minneapolis, under the command of Lt. K. B. Salisbury.

The Marine Reserve Aviation Squadron, VO 7 MR, attached to the naval reserve aviation base at the field conducted its first annual active duty training period under the direction of Major Melvin J. Maas, the commander.



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NEWS OF THE SCHOOLS

Betsy Ross Unit In New Quarters

MEMBERS OF the Betsy Ross Air Corps, national organization of licensed women pilots, have established new headquarters and club rooms at the Hotel Stats, Kansas City for the convenience of members of the Seventh Corps Area and their guests.

The new quarters will be maintained permanently, in addition to the national headquarters at the Municipal Airport in Kansas City.

Des Moines Schools Give Courses

STUDENTS TAKING aeronautical courses in the Des Moines High Schools receive credit as applied physics. The work is divided into two semesters, the first dealing in aerodynamics and the airplane and the second, the airplane engine.

Equipment includes an air-cooled engine and a wind tunnel, built, with the exception of the motor, entirely by the students under the supervision of an instructor.

Derby School Elects Officers

EDGAR COLLINS was elected president of the Derby Flying School, San Francisco Bay Airdrome, at a recent meeting. Other officers are Dr. Bert R. Spait, vice-president and Jack Kerwin, secretary-treasurer. Jerry Meek is the owner and operator of the school.

More than 2,500 hours of student instruction have been completed in the short time the school is in existence.

Glider Meet at Akron

THE ANNUAL glider meet held at Akron Municipal Airport this year took place October 14-15. Dr. Wolfgang Klemperer, vice-president of the Soaring Society of America, attended the meet as did Gus Haller and Emerson Mahlhose.

Twenty-one pilots participated in the contest with seven gliders. A new glider record for loops was made by Willis Sperry, who looped 68 times. B. Sutherland, who was close behind him with 63 loops, also won the combined bomb-dropping and spot landing contest. The duration contest was won by Pilot Shulz of the ABC club in Detroit with a flight of more than 12 minutes.

Aeronas Taken Cross-Country

A FORMATION flight in three Aeronca monoplanes was made by six members of the Ritchey Flying School of Fort Worth, Tex., recently. The trip, covering 900 miles, was completed in about a week enabling the students to entirely familiarize themselves with read-

ing maps and flying by instruments. No effort was made to make time.

Edwin W. Ritchey, owner and operator of the school, commanded the flight.

BOEING SCHOLARSHIP OFFERED

THE W. E. BOEING Scholarships will be offered again during the 1933-34 school year, according to officials of the Boeing School of Aeronautics, Oakland, Calif. These represent the fifth annual awards which have been made for four aeronautical training courses, valued at \$7,500.

Awards will be made on the basis of an 1,800- to 2,000-word essay on any aeronautical subject the writer may choose. Eligibles are restricted to undergraduate students in regular attendance in some university, college or junior college in the United States or Canada which offers at least two years of work leading to a Bachelor's Degree in Arts or Sciences. The competition closes April 1, 1934.

Flying School Shows Profit

AFTER DEDUCTING all items of overhead including depreciation of equipment and salaries, McCray Air College, Fairview, Pa., reports a surplus of large enough proportions to carry it through the lean months of the flying year, according to Gerald W. Richardson, chief pilot, who also reported the sale of a Stinson Reliant to Hubert Hall.

Clevelanders Organize

TWO DELEGATES from each of the amateur airplane clubs in Greater Cleveland met recently and organized the Cleveland Glider Association. The meeting was called by the Case Club to stimulate interest in glider activities for many organizations which are not able to afford a glider of their own.

Five New Students at Ryan

FOUR NEW students have enrolled to take the advanced transport instruction course at the Ryan School of Aeronautics, San Diego, Calif. Each of these men already holds the equivalent of a limited commercial license and has enrolled for the rest of transport training.

Another new student is Hee Low, formerly of Canton, China, who is being trained in mechanical work, a profession he intends to continue when he returns to his native land.

Gets Giro for Instruction

A PITCAIRN autogiro was recently purchased by the Rising Sun Aircraft School, Inc., of Philadelphia, Pa., for advertising purposes, while a dismantled autogiro has been added to the school's equipment as have two Curtiss D-12 M engines which will be utilized by students in their work.

Form Association at Minneapolis

THE PILOTS and Owners' Association has been organized at the Wold Chamberlain Municipal Airport of Minneapolis, with Airport Director L. D. Hammond, president; Miller Wittig, vice-president; Charles Wheelock, secretary, and C. E. Spring, president of Northland Aviation Co., treasurer.

Kerwood Again Heads ILA

AT A meeting of the American section of the International League of Aviators, Col. C. W. Kerwood was reelected for another three-year term. Bernt Balchen, Capt. Eddie Rickenbacker, Rear Admiral Richard E. Byrd; Clayton Knight, Harold E. Hartney, Elliott White Springs and Harry A. Bruno were renamed as members of the executive committee.

School Gets Airport

KENYON COLLEGE, Gambier, O., art school is to have a private airport, following lease of a 10-acre plot on the outskirts of the city. Arrangements have been made for grading and leveling the field and for the construction of a concrete hangar. When completed, the airport will be available for Kenyon students, alumni and guests.

Teach Youngsters Aviation

AN AVIATION "kindergarten" has been opened in the Casey Jones School of Aeronautics at Newark, N. J. Twelve boys and three girls are registered in the class, formed after an experimental group for youngsters was held at the school.

Boeing Enrollment Large

CAPACITY ENROLLMENT for fall quarter courses at the Boeing School of Aeronautics, Oakland, Calif., is expected to result in equally heavy registration for Winter term class, as many students planning to start courses during the autumn term had to postpone enrollment. Forty-five new students entered in October, with a number of students continuing classes begun in previous terms.

Flight Instructor LeRoy Gregg, who has been teaching flying for 18 years in both military and commercial schools, soloed his three hundredth flying student recently. His record was made without a mishap.

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LIMITED COMMERCIAL Students receive a pair of Resistal Goggles and a Leather Flying Helmet, FREE.

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MECHANICAL Students receive a complete kit of tools and coveralls, FREE.

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Transport Pilot's Flight and Ground Course	\$1,745.00
Limited Commercial Pilot's Flight and Ground Course	520.00
Private Pilot's Flight and Ground Course	375.00
Master Mechanic's Flight Course (15 hours)	300.00
Master Mechanic's Ground Course (5 Months)	225.00
Regular Mechanic's Flight Course (15 hours)	225.00
Regular Mechanic's Ground Course (3 Months)	135.00

Enroll with SPARTAN and save the difference.



PRIVATE FLYING

Air Meet at San Francisco

THE PACIFIC International Air Pageant will take place at the Curtiss-Wright-San Francisco Airport, San Mateo, on December 16 and 17, under the direction of Capt. Frank A. Flynn. The meet will be under the auspices of the National Aeronautic Association and will be fostered by civic, patriotic, veterans, community and fraternal organizations of northern California, Flynn said.

Invitations have been sent to a host of American and foreign fliers asking them to participate in the events. On the evening of the first day of the meet a civic reception and ball will be staged in the Civic Auditorium. Here government, state and civic authorities are expected to welcome the fliers. Plans are under way to obtain the services of Army, Navy and Marine fliers in addition to having Roscoe Turner, Jimmie Wedell, Roy Minor, Ray Moore, Art Goebbel, Frank Hawks and others at the meet.

Oldest Yale Grad, 100, Flies

THE Rev. Dr. Augustus F. Bear of Norwalk, Conn., Yale's oldest graduate and oldest Congregational minister in the United States, took his first flight at Mollison Airport, Bridgeport, Conn., following an invitation of Walter E. Goddard, Stratford banker. The 100-year-old minister took a fifteen-minute ride over Bridgeport in a plane piloted by Fred Moller, president of Northeastern Air Service, Inc.

Griffin Plans World Flight

BENNETT GRIFFIN, who unsuccessfully attempted a flight around-the-world with Jimmy Mattern, is planning a two-stop flight around-the-world in a plane of special design, he revealed recently. The plane, he said, was now un-

der construction and will be equipped for flying at extremely high altitudes.

Griffin said the plane would be powered by two engines, each of which will have three superchargers. He expects to attain a speed of 300 miles an hour at 35,000 feet in his new plane, which he hopes will be ready by next spring.

BROCK RECORD 4-YEARS OLD

FOUR YEARS of flight a day, or 1,461 consecutive days upon which he has flown at least once, was completed November 15 by Dr. John D. Brock, Kansas City pilot who has only one year to go to reach the half-way point in the 10-year mark he set as his goal. In celebrating the event, a flight into four states was made by Dr. Brock accompanied by many planes carrying fliers from neighboring cities. The trip assumed the aspect of a good-will junket with luncheons and speeches arranged at many of the stops along the route.

Four Wigginses Fly

AT THE Hillsgrove, R. I., state airport there is a flying family. E. W. Wiggins, Sr., operator of the E. W. Wiggins Airways, Inc., was the oldest man in Rhode Island to obtain a private pilot license when he received it about a year and a half ago, and has since then accumulated between 200 and 300 hours. Going to the other extreme, his son was the youngest boy in the state to receive his license, being a little over 16 years of age when he was ready to fly solo. Not to be outdone by the male members of the family, Kathleen obtained her license during the summer of 1932 while Ruth, a senior at Wellesley, took flying instruction during the past summer.

All of them, of course, have done their flying through E. W. Wiggins Airways, Inc.

Sells Land by Air

AIRPLANES AS the *modus operandi* of sales in a large land development project in Washington is the plan of F. C. Talbot, general manager of the Puget Mill Co., Seattle, which is negotiating a development program for 16,000 acres of land north of Seattle. Mr. Talbot is now the owner of a Kinner monoplane and expects to purchase others for the use of officials and employes of the company for sales promotional work. A branch office will be opened on Boeing Field and it is expected the company will build its own airport on the acreage to be sold.

Prepare for Miami Races

SIGNIFYING THE official opening of the Miami season for the past five years, the social and sporting events centered around the Miami All-American Air Races will be planned more brilliant and of broader scope than ever before. The entire New Year's week will be given over to these events and this will be climaxed by the possibility of a great attendance at the meet when it is held January 11, 12 and 13.

At the races early this year, the attendance was broken when 300 planes of all types, representing the latest civilian high speed developments, and the Army, Navy and Marine Corps engaged in mid-winter maneuvers.

Special plans are under way by the Greater Miami Hotel Men's Association to house the pilots, members of the industry and air race fans who go to the winter resort for these events.

Hold Air Party at Baltimore

AN AIRPLANE treasure hunt and a delayed parachute jump featured the aerial demonstrations staged at Service Field, Baltimore, Md., by E. R. Schilling and D. J. Ruthven.

Charles Taylor dropped from 16,000 feet, leaving a trail of flour behind as he fell before pulling his rip cord. The air activities also included bombing demonstrations, balloon bursting and formation flying by a squadron of army planes from Bolling Field, Washington.

Rainey Flies 12,000 Miles

"I LIKE IT. It's the way to travel." These are the sentiments of 73-year-old Speaker Henry T. Rainey of the House, who after flying 12,000 miles since January to make speeches throughout the country in defense of the Roosevelt program, has become an airplane addict.

Eleven L. C. Pilots Log 1,000 Hours

L. W. STACEY, a limited commercial pilot of Orlando, Fla., has logged over 6,000 hours, more than any other pilot in his classification, according to the Aeronautics Branch of the Department of Commerce. Ten other limited commercial pilots have 1,000 or more hours to their credit and of the 1,117 such pilots whose licenses are active, 349 have more than 200 hours each.

Fleming Wins Air Contest

AN AERIAL treasure hunt, which began and ended at Wings Field, Blue Bell, Pa., was held November 12 with W. T. Fleming, in a Waco F, winner over ten other contestants. Among the sportsmen pilots who participated were Larry Sharples, J. Story Smith, Bud Lieber, Abbie Wolf and Harry Harrison, 3rd.



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Just as there are outstanding colleges for the training of doctors, lawyers, engineers and other professional men, so there are outstanding schools for the training of aviation pilots and future executives.

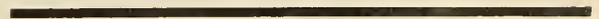
For four years the name of Penn School has stood for all that is best in aviation training. This reputation has been won by a record of achievement in which not a single Penn graduate has failed to pass the Department of Commerce tests. Because of its close association with Pittsburgh Aviation Industries Corporation and Pennsylvania Airlines, Penn School has outstanding advantages for training its students in the needs of the industry. Penn School affords experienced guidance and opportunity for study and advancement in every branch of aviation. Write for particulars.



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AERONAUTICAL INDUSTRY

Seek 10,000 Small Plane Buyers

BELIEVING THAT the private flying business cannot grow until a low-priced and easily operated plane is available on a mass production basis, Eugene L. Vidal, Director of Aeronautics of the Department of Commerce, has launched a plan which has for its goal a minimum production of 10,000 small airplanes by next spring. These planes would sell for about \$700, or even less.

The Aeronautics Branch, Mr. Vidal said, has begun a survey of the 14,000 licensed pilots, 11,000 student pilots and 8,500 licensed mechanics in the country, asking them if they would purchase such a plane. "All that is needed is to bring producer and consumer together, with definite assurance that the market exists," said Mr. Vidal. "We are now taking that step and if favorable reaction is received, a first volume of 10,000 planes will be planned for the industry."

"It is a comparatively easy task to design and turn out on a volume production scale the plane we have in mind. It would be a small, low-wing monoplane, would carry two passengers, be constructed of a new steel alloy, fitted with an eight-cylinder, small bore engine of about 4,000 revolutions per minute, and equipped with a geared propeller. The outstanding feature would be the landing speed of about 25 miles an hour which would be brought about by 'air brakes' in the form of flaps. The cost of operating this type of plane would be less than that of an average priced automobile. . . ." Top speed probably would not exceed 100 miles an hour.

Volume production of these planes would give a decided impetus to employment in factories, and would be a healthy and natural stimulant to the further development of airports, schools, clubs, service stations and repair bases, and other related activities in the industry.

Mr. Vidal suggested arrangements al-

lowing sale of the planes on credit plans and said that maintenance thereof would be reduced to a minimum, since they would be made rugged and durable.

EXPORTS TOTAL \$722,032

PRELIMINARY STATISTICS for September, 1933, indicate that China was our largest buyer of aeronautical equipment, purchasing 12 planes, one engine and \$57,472 worth of parts and accessories. The total value of her imports from this country was \$329,367.

Russia purchased 588 aircraft engines, valued at \$31,625, and \$2,144 worth of equipment and accessories, while Brazil bought nine planes, valued at \$106,875. Yugoslavia was the largest buyer of parachutes, its purchases coming to \$6,100.

The total value of all exports of aeronautical equipment for the period was \$722,032.

Bendix Profit Tops Million

FOR THE nine months ended Sept. 30, Bendix Aviation Corp. reported a net profit after taxes, depreciation, interest and other charges of \$1,096,367, equal to 52 cents a share on 2,097,663 shares of capital stock. This is contrasted with a net loss of \$367,307 in the corresponding period last year.

Net profit for the quarter ended Sept. 30 after the same deduction was \$546,980, equal to 26 cents a capital share, compared with \$816,849, or 39 cents a share in the preceding quarter and a net loss of \$315,180 in 1932 third quarter.

C. A. Snow Gets Aero Post

THE APPOINTMENT of C. A. Snow, Jr., as aeronautical expert with the Aeronautics Branch of the Department of Commerce was announced by Eugene L. Vidal, Director of Aeronautics. Mr. Snow, a Washington, D. C., attorney, volunteered his services to the Branch at a remuneration of one dollar a year.

A licensed pilot and experienced in various phases of aeronautics, Mr. Snow will act in an advisory capacity in connection with developing and perfecting aids to air navigation, instruments, radio and similar work. He will also aid in flight testing and give practical service trials to equipment being developed.

Mr. Snow served with the Army Air Service during the war and was commissioned in the reserves in 1920, his present rank of major bringing him command of the 409th Reserve Attack Squadron, based at Bolling Field.

Folding Wing Brings Orders

AN ADDITIONAL shift has been put on at the Security National Aircraft Corp. factory, Downey, Calif., due to orders received since the announcement that W. B. Kinner's patented folding wing has been added as an exclusive feature on Security Airsters, following its approval by fliers. It also has passed Department of Commerce tests.

According to Sam C. Breder, the folding wings are positively foolproof. The plane cannot take off unless the wings are locked in place; once locked it is impossible for them to become unlocked in the air. Folding or unfolding is a process accomplished without tools in a few minutes.

Manufacturer Changes Personnel

RECENT CHANGES in personnel of Steel and Tubes, Inc., Cleveland, O., subsidiary of Republic Steel Corp., were announced by J. F. Keeler, sales engineer.

A. V. Grove has been transferred from the home office to the Chicago office in the sales department; R. E. Doyle is now sales correspondent in the Cleveland office and J. F. Keeler is now sales engineer with headquarters at 224 East 131st St., the Cleveland office.

Fairchild Sales Increase

A DECIDED and gratifying increase in sales of various models in the past few months has been reported by executives of Fairchild Airplane Sales Corp., of Woodside, N. Y., resulting in the receipt of a number of orders which are booked well ahead of production. Production and employment at the Fairchild plant in Hagerstown, Md., is now the highest that it has been in three years.

(Continued on following page)



Shell's aviation managers, J. A. Macready, Jimmie Doolittle and R. G. Irvin

**KELLETT
AUTOGIROS
EVERYWHERE
!!!!!!**

IN CONSTANT USE IN:

UNITED STATES
ARGENTINE
BRAZIL
JAPAN

(BY THE JAPANESE ARMY)

☆
and now

☆

a KELLETT AUTOGIRO goes with
ADMIRAL BYRD to the ANTARCTIC

KELLETT AUTOGIRO CORP.
Atlantic Bldg., Philadelphia, Pa.

• SANTA NEVER FORGETS,

**AT
CHALFONTE-
HADDON HALL**



"A Merry Christmas to all" is again our pledge at Chalfonte-Haddon Hall. For, frankly, we like to play Santa Claus. Maybe it's because we've done it so often, and because it seems to please our friends.

Again we've planned a real old-fashioned Christmas for you, the sort that will make a worthy destination for a holiday flight. . . . Special entertainments in the hotels. . . . Out-of-doors, golf on the year-round courses, or a brisk turn by the sea till your cheeks glow like St. Nick's and your appetite is rampant. . . . Then

a triumphant Christmas Dinner that will make you think Santa's turned chef.

At night the Boardwalk is a carnival of lights and gaiety. It will be so much fun you'll want to remember every minute. So fly down Saturday and let your holiday start at Bader Field, the fine Atlantic City Airport. We'll be glad to meet you there. Low winter rates. American and European plans.

CHALFONTE-HADDON HALL

ATLANTIC CITY

Leeds and Lippincott Company

What will 1940 demand of aviation men?

THE important steps in commercial aviation's present era of development are all towards greater efficiency.

Since the day it opened, the Boeing School has rated efficiency *first*. Every scientific improvement in flying is now taught here as soon as it is adopted by United Air Lines, the world's largest air transport system in point of mileage flown.

Through the completeness of its ground courses and equipment—laboratories, shops and classrooms—the Boeing School *sets the standard* for this country.

Back of this training is the unequalled group manufacturing experience of the Boeing, Sikorsky, Stearman and Vought airplane companies; Hamilton Standard Propellor and Pratt & Whitney, engine manufacturers—all affiliated with Boeing School—and the 60 million miles of flying experience over United Air Lines.

Ask any airmail pilot to give you *his* opinion of Boeing standards, and their place in the future of aviation. For complete details regarding enrollment requirements, courses, costs, etc., send for the illustrated Bulletin. The coupon brings it.

GET THE BEST TRAINING: IT PAYS
Next Regular Enrollment, January 2

BOEING SCHOOL OF AERONAUTICS

Division of
**UNITED AIRCRAFT
AND TRANSPORT
CORP.**

BOEING SCHOOL OF AERONAUTICS
Room L-12, Airport, Oakland, California

Gentlemen: I am interested in

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|---|--|
| <input type="checkbox"/> Boeing Master Pilot | <input type="checkbox"/> Boeing Master Mechanic |
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| <input type="checkbox"/> Limited Commercial Pilot | <small>(Open to holders of
Transport Licenses)</small> |
| <input type="checkbox"/> Private Pilot | |

Name _____ Age _____

Address _____

City _____ State _____

(Continued from preceding page)

New Record Category Established

THE FEDERATION Aéronautique Internationale will hereafter recognize transoceanic and long transcontinental flights as part of a new classification of records, it was announced recently. Among routes to be covered by the ruling are the following: London to Cape Town, New York to San Francisco, Paris to Saigon, London to Sydney, Paris to Tananarivo, Friedrichshafen to Rio de Janeiro, Amsterdam to Batavia, Rome to Rio de Janeiro and Rome to Cape Town. Other routes of more than 2000 kilometers in length will be included later.

New Jersey Ruling on Seaplane Control

IN CONNECTION with an application of the Marine-Air Transport Co. of Jersey City, N. J., to operate a seaplane commuter service between New York and Lake Hopatcong and Lake Mohawk, N. J., the state attorney general ruled recently that the New Jersey Aviation Commission was authorized to

issue permits for commercial landings, if it was advisable, but that consideration must be given to the rights of owners of property. Regulation of such landings, formerly held by the New Jersey Board of Commerce and Navigation, which last year restricted such planes from landing on the lakes, has been transferred to the Aviation Commission by the attorney general's decision.

North American Reports Loss

A NET loss, before depreciation, of \$22,584.96 for the first nine months of 1933 was reported by E. R. Breech, president of North American Aviation, Inc., for the holding company and its wholly owned subsidiaries. The net loss came to \$355,859.23 after deducting depreciation charges amounting to \$333,274.27.

The net loss of \$355,859.23 would be reduced to \$256,866.45 for the period if the equity of the holding company in the net profit of its subsidiary, in which a majority of stock interest is held, was included.

Weather Stations Get New Equipment

THIRTEEN RADIO stations on the Federal Airways System have been equipped by the Aeronautics Branch of the Department of Commerce with remote control equipment by means of which the radio communication transmitter and the radio range beacon are operated from a control station at the airport, which also has teletypewriter facilities and is equipped for weather observations. Twenty-eight stations are now using the new type antenna developed as a means of more efficient radio range beacon transmissions.

According to Eugene L. Vidal, Director of Aeronautics, the Department's program at present calls for equipping 69 stations with the new remote control procedure while approximately 70 stations are to be equipped with the new antenna, said to be the most effective yet devised for radio range beacon transmission and utilized also for transmission of weather broadcasts.

• Digest of Recent Events •

Graf Flies From Chicago

PAYING ITS respects to the Century of Progress in Chicago, the *Graf Zeppelin* took off for Friedrichshafen, its base in Germany with a load of passengers and mail. The dirigible came to Chicago from Akron after a flight from Miami, South America and Europe. A new speed record between Friedrichshafen and Pernambuco was established at 72 hours, 40 minutes. NOV. 1.

Round-the-World Airline Planned

THE GOODYEAR-Zeppelin Corp., Akron, O., is contemplating the use of dirigibles and airplanes on a round-the-world air mail and passenger service which would connect Washington, Paris, Barcelona, Batavia, Manila, Japan, Hawaii and Los Angeles. The American interests in the project are to be closely connected with German enterprises. Service is said to be contingent upon receipt of mail contracts from the Post Office Department and with these the company believes it could have four dirigibles in service in a year or so. NOV. 3.

Mussolini Takes Balbo's Air Post

THE PORTFOLIO of Minister of Air has been assumed by Premier Benito Mussolini, the former holder, Italo Balbo, being appointed Governor of Libya, an Italian colony in northern Africa. In addition, Mussolini also took over the post of Minister of the Navy in a move toward consolidation of control of

Italy's armed forces under a single Ministry of National Defense. Mussolini has been Minister of War for some time. NOV. 6.

Complete Ocean Mail Flight

A GERMAN flying boat crossed the South Atlantic in about 15 hours after making a stop in mid-ocean where it was taken aboard the *Westfalen*, German ship acting as an ocean airport. The ship is equipped with a trailing canvas tending to eliminate rough seas. The plane lands alongside the ship, is hoisted aboard and after being refueled and checked over, is then catapulted off on its way across the rest of the ocean. The flight from the mainland of Europe to the ship was made in about six hours. NOV. 8.

Woman Heads Russ Air Unit

THE CHIEF of the special service department of Moscow's experimental military flying station is a woman, Major Nadezhda Sumarokova who has 50 aviators under her command. Much of her time is devoted to scientific research work, since she is an authority on equipping planes for scientific and student flying. She invented and organized Russia's first flying laboratory. NOV. 10.

Wedell Flies to Miami in 5 Hours

NEW YORK and Miami are only 5 hours 1 minute apart in Jimmie Wedell's racer, which left Floyd Bennett Field in New York and after averaging about 300 miles an hour over most of the

route, landed at Miami almost an hour and nine minutes ahead of the old record. NOV. 19.

Lindberghs to Fly South Atlantic

CONTINUING THEIR aerial-survey tour, Col. and Mrs. Lindbergh reached Villa Cisneros, Africa, after flying from the Canary Islands. In view of their announced intention to fly the South Atlantic, it was expected they would go to Cape Verde before taking off for South America, and there probably follow the Pan American Airway's route back to this country. NOV. 26

C-W to Build In Russia

CYCLONE AND other Wright aircraft engines, will be manufactured in Soviet Russia under a foreign licensing agreement, the project involving a new five-year military and commercial aviation expansion program. It is understood the Wright Aeronautical Corp., will send a skeleton force of key men from Paterson to take charge of and direct operations in the Russian factory. The Wright factory will be called upon to supply both engines and parts to the Russian Air Ministry in gradually increasing amounts in the next five years as production increases in the Soviet plant and replacements are made possible. NOV. 12.

• Coming Events •

Pacific International Air Pageant. Curtiss-Wright Airport. San Francisco, Calif. DEC. 16-17.

Second International Egyptian Aviation Meeting at Cairo, Egypt, under Aero Club of Egypt auspices. DEC. 18-24.

Thirty-second Annual Conference of the Fédération Aéronautique Internationale, at Cairo, Egypt. DEC. 20-29.

Competition for design of dirigible airshed ends. Institute for Scientific Research of Experimental Airship Construction and Operation. Dirigiblestroy, Moscow, Russia. JAN. 1, 1934.

Annual Dinner, Society of Automotive Engineers, New York, N. Y. JAN. 8.

Sixth Annual Miami All-American Air Races at Miami, Florida. JAN. 11-13.

Annual Meeting, Society of Automotive Engineers, Detroit, Mich. JAN. 22-25.

Dedication and opening, Shushan Airport, New Orleans, La. Air races and events. FEB. 9-13.

Entries for Wm. E. Boeing Scholarships close. Boeing School of Aeronautics, Oakland, Calif. APRIL 1.

International Show of Sport and Touring Aviation under auspices of Aero Club of Switzerland. Palais des Expositions, Geneva. APRIL 27-MAY 6.

Combine Radio Operations

ADVANCES IN design and operation of aeronautic radio facilities have made possible the combination of weather broadcasting and radio-range directional signaling stations at three sites on the Pacific Coast and with additional Public Works funds available, the Department of Commerce is ready to begin work on other stations in the near future.

Each of the stations originally was established with two radio transmitters, located in different buildings on separate plots of ground. Under the combination plan, one transmitter is adjusted to serve as both weather broadcaster and radio-range directional finder; the other transmitter is installed in the same building to serve as stand-by equipment.

The three stations which shortly will be in operation as combination broadcast and radio-range beacon stations, as a result of the authorized program of construction, are at Los Angeles, Oakland and Seattle. Work will begin shortly at Cheyenne, Wyo., and Pittsburgh, Pa., as well as at Albany, N. Y.; Atlanta, Ga.; Boston, Mass.; Buffalo, N. Y.; Charleston, S. C.; Cincinnati, O.; Fresno, Calif.; Greensboro, N. C., and Spartanburg, S. C.

Move Equipment to Muskegon

FOLLOWING THE recent purchase of the assets of Driggs Aircraft Corp., of Lansing, Mich., and Pierson's Flying School of Belmont, Mich., the entire stock and manufacturing equipment of the latter has been moved to the Muskegon County Airport, home of Skylark Aircraft Corp., the buyer. Here, it is intended continuing the manufacture of the Skylark, a two-place open cockpit biplane and to offer a complete school and repair service.

The officers of the new company are Paul B. Kilmer, president; E. Norman, vice-president; Roland Pierson, secretary, and B. H. Seydel treasurer.

Homestead Appoints Alabama Agent

AN EXCLUSIVE representation agency covering the state of Alabama has been given to the F. J. Evans Engineering Co. of Birmingham by the Homestead Valve Manufacturing Co. covering the sale of the latter's Hypressure Jenny, a vapor spray machine used for automotive, industrial aeronautical and industrial cleaning.

Air Board Commissioners Appointed

FOUR NEW commissioners have been added to the Michigan State Board of Aeronautics. They are Thomas E. Walsh, airport manager of the Grand Rapids Airport; Robert Robinson, World War veteran of the air service; Austin F. Bement, member of the Aircraft Bu-

reau, Detroit Board of Commerce, and Milo Oliphant, owner and operator of the Ypsilanti Airport and head of Michigan Aeronautical Corp.

Texas Aviation Group Meets

THE SECOND annual meeting of the Texas Aviation Conference was held at Fort Worth, Tex., October 17-19, with a score of national and local aviation officials attending. The ground covered included election of officers and talks by members and others.

Officers elected were Fulcher Arm-

strong, airport manager of Wichita Falls, president; B. B. Owen of Dallas, vice-president, and Preston Sneed of Dallas, secretary.

Eugene L. Vidal, Director of Aeronautics, spoke on regulations of aviation; Maj. J. Carroll Cone, Director of Air Regulation of the Department of Commerce, spoke on the work of his department, while other talks were made by L. B. Manning, of American Airways; A. P. Barrett and Lon Smith, one of the members of the State Railroad Commission.

**"JOHNSON'S WAX
INCREASED MY SPEED
3 TO 4 MPH" SAYS ART CHESTER**



This well known racing pilot won five races for planes of 375 cu. in. displacement or over at the International Air Races in Chicago, September 1-4, 1933. He has this to say about wax:

"I feel that the complete treatment of my ship with your Johnson's Cleaner and Wax contributed considerably to my success at these races. As near as I can determine, it has increased my speed by three to four miles per hour, as well as greatly added to the appearance of my ship. I received many compliments on the appearance and finish of my ship and I shall always consider a thorough application of Johnson's Wax as a logical and advantageous finishing touch to a racing ship as well as any other." Signed ARTHUR C. CHESTER

LOOK FOR THIS SIGN: It signifies an authorized Johnson Waxing Station. Have a corner of a wing waxed and see what a tremendous difference it makes.



DEALERS: Airports, hangars, schools interested in hearing about dealer opportunities, write S. C. Johnson & Son, Inc., Racine, Wisconsin for full details, samples, etc.

**JOHNSON'S
AUTO AND
AIRPLANE WAX**

S. C. Johnson & Son, Inc., Dept. AD12, Racine, Wisconsin • Please send me a free sample of your cleaner and wax for airplanes.

Name

Address in full.....

(Continued from preceding page)

Boeing Delivers New Transport

ALTHOUGH ITS performance has not yet been announced, the Boeing 247-A transport plane for executive use of United Aircraft & Transport Corp., has been delivered by Boeing Airplane Co. to Hartford, Conn. The plane is similar in many respects to the Boeing 247 in use on United Air Lines, but is powered with two 650-horsepower Twin-Wasp Junior engines, the first commercial transport type ever to be so equipped.

Following initial test flights at Seattle, the plane was licensed by the Department of Commerce, but at Hartford, it is undergoing further test flights.

Other Boeing activity includes the completion and flight of the first of a fleet of all-metal low-wing Wasp-powered P-26A fighters, designed, if desired, to carry two machine guns and bombs.

Eichhammer Fairchild Representative

APPOINTMENT OF H. Eichhammer, formerly with the Aeronca organization for a number of years, as factory representative in the southwestern territory, has been announced by Fairchild Airplane Sales Corp., Woodside, N. Y.

At present, Eichhammer is demonstrating the Cirrus-powered Fairchild 22. Later, he will make a comprehensive tour of his territory in a Fairchild 24, a two-place, side-by-side cabin job powered by a Warner engine.

Manufacturing Profits Up

FURTHER EVIDENCE of better and improved business conditions are seen in reports from various aircraft manufacturing companies, two of which have announced substantial net profit increases.

Curtiss-Wright Corporation and its subsidiaries report for the quarter ended September 30 net profit of \$154,376 after depreciation, interest and taxes compared with a net profit of \$423,320 for the quarter closed June 30 and a loss of \$408,-

664 for the third quarter of 1932. For the nine months ended September 30, the net profit after deductions was \$582,450 compared with a net loss of \$376,306 for the first nine months of 1932.

Waco Aircraft Company showed a net profit for the nine months ending September 30, 1933 of \$113,307.31 after deductions. This compares with a net profit of \$55,756 for the first six months of the year which compared with a net loss of \$61,213 for the first six months of 1932.

104 Anti-Aircraft Lights Ordered

SPERRY GYROSCOPE CO., Brooklyn, N. Y., was awarded a War Department contract for 104 powerful anti-aircraft searchlights built to stretch visible beams for 100 miles. Sixty-one will be of the portable type and the balance of the mobile type, each capable of producing beams of 800,000,000 candlepower.

The \$2,015,900 cost is coming out of the \$7,000,000 allotted by the Public Works Administration for coast defenses and the order is described by the Department as "an important step in the modernization of the equipment of our Army." It is estimated 1,000 men will be given employment for a 15-month period in fulfilling the contract.

Dr. Whitehead New Medico Head

SUPERVISION OF all medical examinations for pilots' licenses is now under the direction of Dr. R. E. Whitehead of Indianapolis, who has been placed in charge of the medical section of the Aeronautics Branch of the Department of Commerce. Dr. Whitehead succeeds Dr. Eldridge S. Adams, who resigned to teach in Shanghai.

The new chief of the division has served as a field medical examiner for the Department since 1929 and holds a transport pilot's license. He is a captain in the Army Air Corps Reserve and Indiana governor of the National Aeronautic Association.

Ten More Condors Bought

AMERICAN AIRWAYS, operating company of the Aviation Corporation, has purchased ten Curtiss-Wright Condors to augment the nine already in service on its routes, thus bringing sales of this 15-passenger transport for the year to 31. The value of the ten planes has been placed at \$625,000.

According to Ralph S. Damon, president of Curtiss-Wright Airplane Co., St. Louis, Mo., Eastern Air Transport is using nine Condors in its operations, the Army has two which have been assigned to Washington and another has been sold to Admiral Richard E. Byrd for flights over the South Pole.

The Condor has a top speed of 170 miles an hour, cruises at 150 miles an hour and, with its two 700-horsepower Wright Cyclones mounted on rubber blocks, vibration at this point is reduced to a minimum. Among its other features is a retractable landing gear and sound-proofing which allows passengers to converse freely while flying.

Commercial Production Increases

AN INCREASE in production of aircraft manufactured in the United States is seen in statements by the Department of Commerce indicating manufacturing activity for the first nine months of the year. During that period 1,065 planes were produced, 552 of them for domestic civil use. The total represents an increase of 45 over the similar period last year.

The survey shows the 552 planes included 410 monoplanes, 135 biplanes and 7 autogiros. Of all the planes produced, 254 were for military delivery and 259, including civil and military, for delivery to purchasers in foreign countries.

The planes for domestic use included 390 constructed by manufacturers producing planes in quantity; 162 were built by manufacturers or individuals producing one or two airplanes each.

In 1932, during the first nine months, manufacturers produced 1,020 aircraft.

To Reduce a Large Inventory of Aeronautical Materials

WE OFFER EXCEPTIONALLY LOW PRICES ON:

Chrome Molybdenum Steel Tubing (All Sizes) . .
 Clevis Pins . . Bolts . . Nuts . . Washers . . Masking
 Tape . . Wheels . . Tires . . Winter Flying Suits . .
 Helmets . . Goggles.

REMEMBER

• JOHNSON'S real leather Pilot's Log Book, with your name in gold, makes a real Christmas Gift; **\$1.** prepaid
 • JOHNSON'S new yellow and black wind cones are made to last longer.

WRITE FOR OUR NEW BARGAIN LIST. WE CAN SAVE YOU MONEY.
 JOHNSON AIRPLANE & SUPPLY CO. (DAYTON MUNICIPAL AIRPORT) DAYTON, OHIO

Settle Penetrates Stratosphere

WITH VALUABLE scientific results collected and with the possibility of owning the official world's altitude record, Lieut. Commander T. G. W. Settle of the Navy and Major Chester L. Fordney of the Marines came down in a New Jersey bog after having ascended to a height of about 11.60 miles, or 61,237 feet.

The two men took off from Akron and after drifting behind a wind completed their flight with the announcement that their cosmic ray investigation was a success from the mechanical standpoint.

In their balloon, Settle and Fordney rose higher than any other group, with the exception of the Russian fliers, who attained 62,304 feet, but whose record is not officially recognized since Russia is not a member of the F. A. I. The American balloon was of 600,000 cubic foot capacity with the gondola suspended beneath it, neither reported as damaged in the landing.

Ex-Cell-O Appoints Representatives

TWO RECENT appointments as representatives of Ex-Cell-O Aircraft & Tool Corp. were announced by John E. Wells, advertising manager. A. R. Sleath will represent the company in the Philadelphia territory, while D. V. Chancellor has been appointed manufacturer's representative in the Southern Indiana and surrounding territory.

Both representatives will handle the company's complete line, including products of the Continental Tool Works Division and Kreuger-Wayne Tool Company division.

Chicago Has Most Planes

THERE ARE one or more licensed or unlicensed planes each in 2,848 incorporated cities and towns in the United States, according to a survey of the Aeronautics Branch of the Department of Commerce, which included all of the 16,598 cities or towns.

It was also shown that in each of 123 cities there were 11 or more planes while in 141 cities there were from six to ten. In 401, there were from three to five; in

448 there were two and in 1,735 there was one airplane each.

The largest number of planes in a single city was in Chicago where there were 287. New York was next with 246; Los Angeles third with 159 and Detroit fourth with 122.

The report includes figures as of October 1, 1933.

BAR WRITTEN TEST FOR LICENSE RENEWALS

AIRCRAFT PILOTS holding Department of Commerce licenses may now obtain a license renewal at any time after its expiration without undergoing a written examination, as heretofore required. The pilot need only furnish proof of his satisfactory physical condition and pass the flight test for the class of license for which renewal is asked.

Applicants for original licenses, however, will still be required to undergo a written examination.

United Income Increases

NET INCOME for the nine months ended September 30, 1933, of United Aircraft & Transport Corp., after deductions for taxes, depreciation, minority interest and after providing for preferred dividend requirements, amounted to \$1,585,036.78, equal to 76 cents on the outstanding shares, comparing with \$1,176,487.15 for the corresponding period last year. For the third quarter of the year, the net profit amounted to \$642,107.40, after similar deductions.

The Board of Directors directed redemption on January 1, 1934, of all of the outstanding 150,000 shares of United's 6 per cent cumulative preferred stock, Series A, at a redemption price of \$55.75 a share, which price includes the amount of the current quarterly dividend which would otherwise be payable on the said shares on that date. Upon completion of this transaction, United will have only common stock outstanding.

New Standards Back

WITH THE purchase of manufacturing rights and materials, Metropolitan Aircraft Corp., of Hackensack, N. J., will re-introduce to the industry the line of New Standard aircraft, production of which was suspended during the stress of economic conditions. The new line will include a two-place trainer, a military trainer, a three-place open cockpit biplane and a five-place open cockpit mail, passenger or combination mail-passenger plane. Several different power plants are optional.

Standard aircraft were among the first produced in this country, the Standard company also pioneering in the manufacture of foreign aircraft during the World War. The Standard J-1 was built for the Government in 1917 and in January of the following year the company received orders for fighting aircraft.

The Metropolitan Aircraft Corp. is headed by T. Seymour Jessup, president, assisted by Charles E. Fatzinger, secretary-treasurer; A. L. Matthews, supervisor of production, and R. S. Komarnitsky, consulting engineer, who was responsible for the production of the new three-place job, and who was associated with the former New Standard organization in a similar capacity.

Hall Chief Engineer

EFFECTIVE NOVEMBER 13, 1933, Randolph F. Hall became chief engineer of the Cunningham-Hall Aircraft Corp., Rochester, N. Y., manufacturers of aircraft.

RCA Building Goes Aeronautical

THE NEWLY opened RCA building in Rockefeller Center, New York, has leased space to two aeronautical associations within a short space of time. Extensive space on the 32nd floor has been taken by Curtiss-Wright Corp., while the Institute of Aeronautical Sciences has opened a clubroom and administration offices on the 54th floor.

It is understood that other aeronautical associations are negotiating for space in the building.

"BILLY" PARKER KNOWS HIS WEATHER

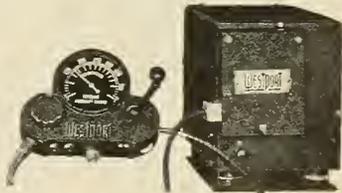
● "I have never seen a radio work as well as the new Westport in our Orion," writes "Billy" Parker, manager of the aviation division, Phillips Petroleum Company. "It has a much greater range than any set I have ever seen. I have been able to tune in the Tulsa beam at El Paso, and receive

weather stations consistently a thousand miles away."

● You, too, can "ride the beam and know your weather." For information on the remarkable Westport Aircraft Radios, wire or write

Pacific Airmotive Corp., Ltd.

United Airport, Burbank, Calif.
Oakland Airport, Oakland, Calif.



Westport Remote Control Model AR62T

What is YOUR boy going to do?

This is a problem that confronts thousands of parents today. Never before has the situation been so serious. Industries are crowded . . . men are out of work. The best that parents can hope to do is give their boys an education in a field which indicates a secure future.

Among such fields is Aviation. It is the most rapidly growing of all industries and has forged ahead even in these bad years. It appeals to the average boy and offers real opportunity for those who are far-sighted enough to prepare themselves. In proof of this, we are proud to state that, to date, the Casey Jones school has succeeded in placing all of the boys who completed their training in its engineering and mechanics courses.

Casey Jones

SCHOOL OF AERONAUTICS, Inc.
558 Broad Street Newark New Jersey

COURSES IN AERONAUTICAL ENGINEERING AND AVIATION MECHANICS



LEARN A TRADE
PROTECTED BY
THE GOVERNMENT

CHRISTMAS GIFT SUGGESTION

Why not an aviation course at the Casey Jones school? It is a gift and an education in one.

AUSTRALIAN TEA PARTY

(Continued from page 19)

Englishman in an English aeroplane makes a long flight, Mr. Grey makes of the achievement an even longer flight in words of ecstasy; if the English, by spending half a million dollars on a stunt speed plane capture the Schneider trophy, Mr. Grey proceeds to suggest that all English aeroplanes are blessed with speeds only slightly lower than that of the winning racer; if an Englishman climbs to a record-breaking height, Mr. Grey seizes his trusty pen and intimates, by clever suggestion, that all English planes can fly higher, class for class, than can the planes of any other less fortunate nation. By this process of optimistic reasoning it is evident that if Mr. Grey were the editor of a paper devoted to deep sea diving he undoubtedly would claim that English divers can dive deeper, stay down longer, and come up dryer than can the divers of any other country.

Mr. C. G. Grey is an interesting, in many ways admirable, and in some ways peculiar product of an admirable and peculiar people. Long ago he came to the unalterable conclusion that any human beings who weren't Englishmen were merely deplorable errors of the

Creator. He looks upon Canadians, Australians, South Africans, and other Colonial subjects as semi-humans somewhat advanced in an evolutionary process which, persisted in through the centuries, eventually may result in their becoming English, and hence perfect. Judging from his witty writings, Americans appear to him as odd growths that might happily have evolved into something resembling Englishmen, only they were deluded enough to revolt in 1776, encouraged an inflow of dubious protoplasm from central Europe, and now are reverting to the embryo; they may be expected to grow tails and leap into trees at any moment, and in another hundred years will be breathing through gills.

Who's Afraid of the Big Bad Lylin'

Now, this grand old British lion sits down each week in his editorial sanctum and like the jolly old wolf of three little pigs fame, he huffs and he puffs, and he blows down everything that comes in his way, including the airplanes of other countries. Each week he writes yards, reams, miles; and in every other paragraph he leaves a mangled Frenchman, Canadian, Australian, American, Turk, or Farnborough official. However, nobody who knows Mr. Grey ever grows

very angry with him, for they know that the dear chap writes many of his editorials while standing on his head; and personally he's such a grand character that people forgive him for the outrages he perpetrates in print. On one occasion he waged a personal war with America, and when it was all over discovered that he had merely been shadow-boxing, for nobody had been fighting or even arguing with him!

I admire Mr. Grey; I wish I was only half as smart as he is. He has the courage of three lions, the tenacity of a bulldog, and a mental maneuverability equal to the physical agility of six rabbits and a pair of nervous squirrels. He can get himself into and out of anything, like the late Houdini.

However, his intensely British complex has led him into a position that has not always been fair to aircraft manufacturers in the United States. He proclaims loudly and often that British workmen are the best in the world, their work perfect, thus gradually building up in the minds of foreign readers the idea that the workmen of other countries are dubs and their work faulty.

It is my guess that English aeroplanes sell in foreign countries about 60% on their worth and 40% on the bombast and buncombe that Mr. C. G. Woof-woof

SCINTILLA

AIRCRAFT MAGNETOS

are standard

ignition equipment on every
engine manufactured by The
Wright Aeronautical Corp.

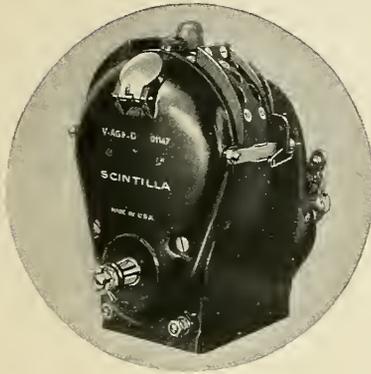
*Makers of Whirlwind and
Advanced Cyclone Engines*

SCINTILLA MAGNETO CO., Inc.

Sidney, New York

Contractors to the U. S. Army and Navy

(Subsidiary of Bendix Aviation Corporation)



Grey has built up for them. Mr. Grey is justly considered an important critic and commentator on things aeronautical; therefore what he says, true or patriotically distorted, carries a great deal of weight—especially when he is wrong: for when he is wrong Mr. Grey is even more convincing than when he is right, for then he is more vehement.

Let's Take Their Bloomin' Prize

The way to combat Mr. Grey's works is to go over to his good country and come back with the prize which his own countrymen, for all Mr. Grey's shouting, apparently will be unable to win, unless they make some frantic new effort. If we do that we will have won a worthwhile prize and it will be a wonderful advertisement for our excellent airplanes, and better than reams of praise anyone could write about them.

The English are the greatest trading people in the world; their products are encountered in every part of the globe. Often they are sold on just such propaganda as Mr. Grey so efficiently sends out in behalf of English aeroplanes and engines: a dogmatic assertion of superiority, a bald statement, often unsupported by any weight of evidence, and often ac-

companied by some belittling remarks about the products of other nations, either expressed or implied. It is an Englishman's habit to consider his goods the superior of the goods manufactured by others. The way to defeat him commercially is to *prove* that your own products are better than his. This we easily may do for American airplanes by winning the MacRobertson Trophy.

In making arrangements for competition in this event matters would be simplified if some body like the Aeronautical Chamber of Commerce would organize an American Speed Expedition, which all interested contenders could join, each paying his own individual expenses. The Chamber could delegate an executive to make all necessary arrangements on behalf of the contestants, thus insuring that all details were taken care of, such as refueling with special gasolines and oils at the various stops, making passport and customs matters easier, and so forth.

Opportunity for the Oil Companies

Or perhaps some of our large oil companies would prefer to sponsor ships and make their own arrangements. Even so, an Advisory Board should be set up by the Chamber, for the winning of this

event would be a matter of national importance that would justify such promotional efforts by the Chamber of Commerce.

Our Transports Ought to Enter

Such ships as the new Boeing and Douglas transports should enter the race, even if they couldn't win first place; the speeds they would make on this long flight would be world-wide advertisements for our wonderful transports. The England-Australia air mail service is to start next year, and the successful tenderer will have to maintain the terrific average speed of no less than 95 m.p.h. Fancy that, now! As our large passenger and mail planes will average nearly twice that speed, the comparison will be obvious to the world.

Now Russia is on the road to world recognition. Hundreds of airplanes and many thousands of engines will be required to equip the vast network of airlines which the Soviet is planning. We should get much of this business.

by Caldwell

Facts...

VALUE: FAIRCHILD planes have always had a lasting value. Never too high in first cost, owners have always found their investment in a FAIRCHILD well justified. Take a look at the used plane bargains advertised in aviation magazines, and see how few FAIRCHILDS are offered. You won't find any of the "22" and "24" models listed, yet many of these planes have been sold throughout the country. The answer is that FAIRCHILD owners are satisfied with their ships, and have no reason to dispose of them, yet if they did wish to sell, they would find a ready market at a price more than sufficient to cover their investment after allowance for the ship's use. FAIRCHILD planes, new or old, have value.

QUALITY: In aircraft, quality comes from the combination of many items, not from what can be seen on the surface. Take a look under the fabric. In a FAIRCHILD you will find a chrome molybdenum steel structure of both square and round tubing. Here is a fuselage which, after welding is carefully sandblasted to remove all foreign substance—then immediately primed with an aluminumized oxide. Further, all tubes in the entire fuselage are sealed air tight. Corrosion from the inside or outside is prevented by such practices. Look further and see that all control mechanisms in a FAIRCHILD operate in ball bearings. Here is real insurance against wear, "slop," and replacement. Even look at a minor item, such as fairing strips, and you find not wood, which will warp and twist, but aluminum tube securely fastened in place by metal clips. Inside the wings you will find the same high quality of design and workmanship. The combination of built-up steel tube and dural tube trusses are

MORE and more aircraft owners and prospects are seeking the actual facts on the planes they desire to own and in this way use their own judgment—come to their own conclusions, rather than swallow the statements of hungry salesmen. We are happy to see, and welcome, this trend. ¶ We find the flying public interested in value, quality, and the utility of a plane. We are glad to give the facts on these items as they affect FAIRCHILD planes.

used. All fittings are designed for their particular purpose, not merely chopped off from a piece of steel, and sandblasted before being cadmium-plated or enameled. A FAIRCHILD wing, completed, has the appearance of cabinet work rather than ordinary wood work.

UTILITY: FAIRCHILD planes are definitely useful in many ways, and for many purposes. Their economy in operation, plus the negligible amount of maintenance expense, tends to make them more useful than other planes. The private owner finds a "22" or "24" useful in his business, and among FAIRCHILD owners you will find many attorneys, engineers, and other business men using their FAIRCHILDS for this purpose. The sportsman pilot can use the same ships for his pleasure, as he finds them stable and most responsive for stunting. The operator makes his investment in a FAIRCHILD profitable, due to the fact that instruction can be given at reasonable rates, and that students take a greater interest, and do more flying, in a modern ship of this type. These facts are proven by the many FAIRCHILDS in use today.

FAIRCHILD offers a plane for every pilot. You are invited to see and fly them—in fact, we are anxious to have you do so. Merely advise which ship you are interested in, and we will do the rest.

Book Reviews

PRINCIPLES OF AERODYNAMICS

By Dr. Max M. Munk

• TWO YEARS ago Dr. Munk wrote a series of articles on the principles of aerodynamics for AERO DIGEST, a feature which was so favorably received he was induced to publish this book. Written in simple language and without any mathematical detail, the new edition contains all of these articles in revised form and adds thereto an almost equal amount of new material, making the book most complete.

In spite of its outward popular form, the edition is really scientific and profound in its treatment of the subject. The reader has a safe guide to a logical understanding of the subject and may rely substantially on every statement, since each has an actual meaning and brings a valuable and instructive message to him.

The book should prove adequate for airplane designers who are interested in the physical and practical end of aerodynamics, but not in its mathematics. For this latter aspect, the reader is referred to the author's "Fluid Dynamics for Aircraft Designers" to which the present book forms at the same time an introduction and a commentary.

Divided into eight chapters, the publication includes one each on general aerodynamics, wing section theory, wing theory, experimental aerodynamics, propeller theory, applied aerodynamics and a miscellaneous discussion involving the wind tunnel, seaplane floats and hulls, aerostatics, the aerodynamics of the dirigible and the future of heavier-than-air craft.

AIRCRAFT AND THE LAW

By Harold Lincoln Brown

• LEGAL ASPECTS of aeronautics are discussed in "Aircraft and the Law" by a California lawyer who has had practical contact with the problems with which he deals. A member of the State Bar of California and the American Bar Association, Harold Lincoln Brown, gives in this book a survey of the rights, duties and liabilities of all persons concerned with aircraft operation, and the interest of the general public in that connection.

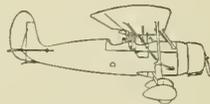
Originally used in part in lecture form, the contents of the book occasionally diverge from legal theory into the realms of fact. Where it seems necessary, fundamental principles of law are touched upon for the benefit of the layman. These are followed by specific applications of the principles.

The book is well indexed, with cross-references to assist in determining legal questions. Another help to the reader is the liberal use of subheads and footnotes.



FAIRCHILD 22
Cirrus Powered
Top Speed... 114 MPH
Cruising Speed 94 MPH
PRICE \$2975

FAIRCHILD 22
Gipsy Powered
Top Speed . . . 110 MPH
Cruising Speed .93 MPH
PRICE \$2475



FAIRCHILD 22
Warner (125 HP) Engine
Top Speed . . . 133 MPH
Cruising Speed 112 MPH
PRICE \$3825

FAIRCHILD 22
Warner (145 HP) Engine
Top Speed... 145 MPH
Cruising Speed 118 MPH
PRICE \$4440



FAIRCHILD 24
Cirrus Powered
Top Speed... 114 MPH
Cruising Speed 94 MPH
PRICE \$3360

FAIRCHILD 24
Warner Powered
Top Speed . . . 124 MPH
Cruising Speed 106 MPH
PRICE \$3850

Descriptive Literature Available for the Asking

FAIRCHILD AIRPLANE SALES CORP.

62-10 Woodside Avenue, New York City



THEY SHOULD DO SOMETHING

(Continued from page 16)

it might be likened to the equally great interest in baseball, football or motion pictures. Flying activities make a good spectacle and good reading, but there is little urge to participate in it. Reasons? They usually boil down to lame excuses, but the answer can be covered in one word—"unsold".

Lack of Sales Power—Selling and advertising of private aircraft has always been underpowered. Plenty of reasons. Scarcity of scientific sales management. Lack of stability and permanency of many of the manufacturers and of their policies. Abandonment of the private market by many of the stronger companies in favor of the more immediate rewards in the contract market. Lack of adequate income to pay for the high cost of reaching out and contacting directly or indirectly the thinly scattered prospects. Owing to the high cost of production, and the temptation if not the necessity of too close pricing, the lack of sufficient profit margin for needed exploitation.

Summing up, it is difficult to make better progress in developing the market for airplanes for private and business use because of these major obstacles: 1. Public inertia. 2. High cost. 3. Nuisance factors. 4. Weak sales power. It is probably because all of these factors are fully realized that the industry as a whole anticipates but a 30 per cent increase in sales in 1934, as reported in the fifth article of this series. In almost any other industry a 30 per cent increase in sales would be a bonanza. In the aircraft industry, sales figures in 1933 being what they are, this rate of increase would not be a cause of general rejoicing although we should all be thankful that the ship is again on the course and making some progress in the teeth of the gale.

What Group Action Should Be Taken

Facing squarely the known obstacles in the path of progress, what is the responsibility of the industry as a whole in this regard? By what united action could it help the different manufacturers to overcome the barrier of staggering sales resistance more readily than appears possible by unsupported individual effort? What specific activities might be contemplated under a well organized, consistently sustained Group Plan?

There are two principle tasks which

could properly be undertaken in a joint marketing program to supplement without usurping the functions of the individual sales organizations. One would be the conduct of intelligent research and surveys on all matters pertaining to the aircraft market so that the manufacturers would have access to up-to-the-minute reports and analyses based on factual material to guide them in planning production and sales. No single manufacturer in the industry is today in a position to undertake this work on an adequate scale. Moreover, it would be highly wasteful for the various manufacturers to attempt to plow over the same ground. The second important task would clearly be to inaugurate a comprehensive advertising campaign to sell the public on airplane ownership and to create actual prospects for the manufacturers to follow up. Again, no single manufacturer today would be warranted in the attempt to do this job as it should and must be done to give the industry the impetus it so sadly needs for genuine rehabilitation.

Let us consider this dual program, draw up a tentative plan of operation and judge how effective it might be in carrying us to our stated objectives in overcoming the four principle obstacles to sales progress.

First as to the gathering and compilation of pertinent statistical and market data for use in planning sales and production. Your central clearing house of information would probably engage in activities of the following character:

Information Gathering Service

1. The participating manufacturers and used plane brokers would be required to report promptly the details of every sale. This report would be submitted on a regular form, giving full information of the purchaser, his reason for buying, his history, if any, as a previous owner, the designation of the plane sold, other data which would contribute to the knowledge of the industry as to public preference and sales trend.

2. Once in the Fall and once in the Spring closed meetings would be held at which various sales and advertising methods would be discussed and experiences exchanged for the benefit of all. Is this a bit too idealistic? We could almost guarantee that one properly conducted meeting of this kind would win complete acceptance of the idea as a permanent feature and that thenceforward no manufacturer would care to miss a meeting.

3. Pilots, owners, former owners and typical prospects would be surveyed periodically, for reactions on various questions and the results would be reported to the industry. Mr. Vidal's venture in this respect has evidently been greeted with a sentiment that is considerably pro and con. It is no part of our discussion here to comment upon the various aspects of the "\$700 plane questionnaire," but one lesson it teaches is very much to the point. If the survey had been conducted by a body appointed by the industry for such purposes, rather than by a governmental department which is not answerable to the industry, those features of the survey and its attendant publicity which have received criticism, would most certainly have been ruled out in the planning.

4. Prospect lists from all the various sources mentioned in the second article of this series would be secured, checked and double checked, and made simultaneously available to all manufacturers.

5. As the airlines have so greatly improved their service to the business traveler and have thereby curtailed the market for airplanes for business ownership, it would be valuable to conduct a searching study of different classes of industries to uncover all possible special uses for company-owned airplanes.

6. Prepare annually a map of the country on which would be shown the actual distribution of all individually owned airplanes with various symbols or colors designating both the number and the price range of the planes as well as the usage—pleasure, business, commercial. These territorial maps would be effective in helping sales managers analyze their potential markets by territories.

The foregoing suggestions cannot be considered either final or complete. But they will serve nevertheless to indicate the scope and kind of information that could be gathered more efficiently and with far greater economy by an organization acting for the industry as a whole than by any one manufacturer. The details of operation present no unsurmountable difficulties once the decision to put it into effect is arrived at.

Sales Promotion Program

Next, as to a program of positive marketing activities which might be placed in operation in behalf of the entire industry, the following are some of the principle

(Continued on following page)

STANAVO



AVIATION GASOLINE

AVIATION ENGINE OIL

ROCKER ARM GREASE

(Continued from preceding page)

undertakings which recommend themselves for consideration.

1. Prepare a sales training course for airplane salesmen. Self-liquidating. This would give a thorough grounding in all fundamentals and would be made available to all manufacturers, distributors and dealers at nominal expense to each. A section dealing with competitive points could be added by the manufacturers.

2. Supply to schools and colleges, at cost, educational charts giving interesting information about airplanes and flying. Self-liquidating.

3. Organize a time-payment finance corporation for good credit risks. Self-liquidating.

4. Work for more advantageous insurance terms.

5. Encourage the establishment of consolidated salesrooms at leading airports where manufacturers could display their planes in presentable surroundings, sharing the expense on a cooperative basis.

6. Make accurate weather forecasts more readily available to private owners.

7. Promote the construction of convenient airports for the use of the private flier. The National Association of Engine & Boat Manufacturers under the direction of its Executive Secretary, Ira Hand, has done splendid work in persuading waterfront municipalities in many important centers to construct harbor facilities for pleasure boats. The name

"Marina" has been given to such ports, to distinguish them from commercial shipping accommodations. The private flier should not be compelled to keep his ship at busy public airports. This need should be considered in apportioning the \$10,000,000 public works fund for airport construction.

8. Encourage the formation of flying clubs and all strictly sportsman-pilot activities. Highly important.

9. Restore an annual national show.

10. Institute a study of the seasonal factors influencing sales and provide manufacturers annually with an accurate sales time-table and analysis.

11. Move to alleviate or abolish some of the many nuisances that discourage the private owner—inspections, examinations, license regulations, log books, fifty-hour ruling, excessive fees, high hangar rentals and maintenance costs, etc., etc.

12. Arrange speaking tours by well-known fliers and other leaders in the industry.

13. Offer an annual prize to the (a) sales manager, (b) distributor, (c) dealer, and (d) individual salesman demonstrating the most constructive sales work.

14. Offer other prizes or trophies for various accomplishments, similar in spirit and purpose to the Loening Intercollegiate Trophy and the Boeing Scholarship and Model Building Competitions.

15. Prepare and distribute propaganda

posters for display in clubs, colleges, store windows, hotels, airport waiting rooms and other advantageous locations.

16. Explore the possibilities of a "fly-yourself" service, so that the young man and woman pilot who cannot afford to buy, may be able to hire a plane at less cost than at present.

17. Organize sales and demonstration tours with suitable showmanship and publicity.

Group Advertising

18. Advertise for inquiries. No manufacturer, however impartial his viewpoint, can tell the story of flying or the advantages of plane ownership with the same degree of conviction as could be done in the advertisement signed by no airplane manufacturer. Tell the story as it has never been told before and invite the reader to write for a copy of an informative booklet.

With the booklet, forward a questionnaire which, if returned, will provide a means of establishing the worth of the inquirer as a prospect for an airplane. Insincere or inconsequential inquirers will not return the questionnaire, but those who are in any sense real prospects will be glad to fill out the questionnaire and send it in for additional information and guidance. To induce the inquirer to fill out and return the questionnaire, he will be offered some reward, such as an airport map, a manual on aerial naviga-

GIVE YOURSELF A REAL CHRISTMAS GIFT

This is the time to think of your future. Take the first step *Now* that will start you on the road to a professional career in Aviation. Give yourself this best of all Xmas gifts by enrolling in the Roosevelt Aviation School, at America's Largest Commercial Airport.

Roosevelt School maintains complete facilities and equipment for teaching every branch of Flying and Mechanics. Courses include: Private Pilot, Limited Commercial and Transport, Ground and Flying also Mechanics and Welding.

In writing for information, kindly state preference and give age, or visit school or phone Circle 7-1550. Ask for Booklet Y.

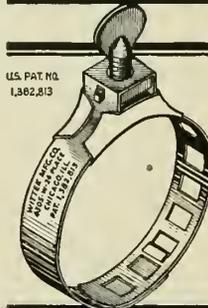
Highest Government Rating

ROOSEVELT AVIATION SCHOOL, INC.

318 West 57th Street
New York City

Mineola,
Long Island

"A Tight Connection All the Time"



U.S. PAT. NO.
1,362,813

TRADE MARK
NOC-OUT
THE
HOSE CLAMP
WITH THE THUMBSCREW

Standard equipment hose clamp of the automotive and airplane industry. Your jobber has them.

4307 W. 24TH PL. **WITTEK**
CHICAGO, ILL. MFG. CO.

EXPERIENCED AIR LINE PILOTS AVAILABLE

For full particulars

Due to reduced schedules and general curtailment brought about by the depression, there are a limited number of highly qualified line pilots available, with practical experience in all weather, day and night flying.

These men prefer line positions but will be interested in any good flying job. Capable of handling positions as operation managers, field managers and other positions requiring executive as well as flying ability.

Whether in air line operations, private or other commercial flying, the best investment is a good pilot.

Communicate with Air Line Pilots Association, 3145 West 63rd Street, Chicago, Ill.

tion, a description of a series of suggested cruises, or some other souvenir of interest only to those who wish to fly.

The answers to the questionnaire will determine the type of plane wanted, the use intended, the price range, and full information about the prospect. This information will be incorporated in a consolidated report which would go forward to all manufacturers at weekly intervals. The duty of the Association in handling the inquiry would thereupon cease.

Under some such plan it would be possible to ferret out thousands of class A, B and C prospects who have thus far remained undisclosed because they have hesitated to come forward and expose themselves to sales solicitations. It is this very obscurity of the possible prospect that makes the selling and advertising of airplanes so costly. A group plan of advertising as suggested might be the best means of solving this difficulty.

To enter into an elaborate discussion here of the best advertising media to use, the various sums of money that would be required to do this and that, would serve no useful purpose. Such matters would be developed in the planning and there are reliable guides to govern every decision that would have to be made.

Appropriation for the Plan

Well, Reader, if you believe that "they" should do some of the things proposed here, you are beginning by now to

worry about where all the money to pay the cost is coming from. We don't know either, but maybe it could be worked out along the following lines.

Let's not make it necessary for the board of directors of any manufacturing company to increase by one penny the sales promotion and advertising budget. Rather, let's propose that they divert ten per cent of their normal budgets toward the group activity for a two-year trial period of a Five-year Plan. The ten per cent of the appropriations thus diverted would be applied to purposes which should increase the effectiveness of the manufacturer's own sales promotion by several times ten per cent. If after the first two years the contributors are not convinced without further ado that the ten per cent has benefited their sales to a far greater degree than any other ten per cent of expenditures, then let the Group close shop.

The aircraft manufacturers alone should not be required to carry the entire burden of the group effort to expand the airplane market. Let all those benefitting indirectly from the sale of private planes—airports, accessory and material manufacturers, oil companies, etc., contribute to a lesser degree, on a uniform basis worked out in accordance with the best judgment of the planners.

No great sum of money might be secured for the Group Plan during the first year or the first several years on the basis

suggested nor could all the activities listed here be entered into at once. But a start, however small, could be made and *should* be made, and will, if properly planned and organized, fully demonstrate the feasibility and the worth of a united effort to expand the market for individually owned airplanes.

Make a Start in 1934

Next year, when the heat and confusion of code planning are past, inter-industry competition for the consumer's dollar will be keener. Many industries are planning greater cooperative movements. If the aircraft industry depends solely upon competition within itself to build sales, progress is bound to lag.

The writer does not presume to advance any winning formula for a group undertaking. A combination of the best minds in the industry after due study, would determine the procedure to be adopted. If the ideas given here help to stimulate thought in the right direction, they will have accomplished their full purpose.

On one point only does the writer take a full and uncompromising stand. It is, that "they," the industry, as a committee of the whole, should do something about it. Whether or not they do—or when—remains to be seen. There was once an airplane advertisement which was headed "Lift Up Your Eyes."

A new thrill for Sophisticated Flyers



WACO AIRCRAFT CO., TROY, OHIO, U. S. A.



WACO LEADS IN AIRCRAFT REGISTRATIONS

● If you're an old-timer at flying, the sleek, streamlined fuselage of this new WACO Model C for 1933 will give you a thrill you probably never expected to have again.

If you're new at the game, you'll get a certain solid satisfaction from the beautiful way this ship handles in the air and its ability to get in and out of tight places.

Here, for quick reading, are some of the "high spots." Luxurious, form-fitting seats. Better vision from both

front and rear windows. Controlled interior ventilation. A cruising speed of 125 miles an hour, with 145 an hour top speed if you want it.

Thus America's favorite ship (according to registration figures) demonstrates its right to hold first place again in 1933.

See this wonder ship the first chance you get. Or write for facts and figures. They will be sent free and postage paid without the slightest obligation on your part.

Member Aeronautical Chamber of Commerce  Manufacturers of Progressive Aircraft Finishes

COLOR MEANS SAFETY
IN THE AIR—ON THE GROUND
* * *

ASK ANY PILOT WHO HAS CRASHED AND NOT BEEN FOUND FOR DAYS
Non-fading orange, yellows and reds of high visibility have been developed by Berry Brothers and adopted by leading air lines for use on new type metal planes. **GET THE FACTS**

BERRY BROTHERS

PAINTS • VARNISHES • ENAMELS • LACQUERS
DETROIT, MICHIGAN WALKERVILLE, ONTARIO

Your Future AVIATION Career Should Pay Rich Dividends



Lincoln Graduates write:
"... Since I completed my training at the Lincoln School I have been employed continuously as pilot. My salary... is \$300 a month. Lincoln trained pilots are preferred because of the character of the training they receive."—C. L. Currier.
"I immediately secured a position with the Council Bluffs, Iowa, Airways. Later I was fortunate in securing a position with the Chicago Tribune delivering their newspapers to Minneapolis by air. I attribute my success to the high class training received in your school."—Morris Cooper.

... If You Are Properly Trained as LINCOLN Trains You!

For a career full of interest and fascination, choose aviation. For proper training that prepares you for a successful aviation career, come to LINCOLN.

You can be a big salaried pilot or mechanic. LINCOLN assures you proper training by Government Licensed Instructors who know how to train you for the better jobs in Aviation.

Government Approved School, internationally known. Modern equipment. Training includes blind flying, cross country, acrobatics, master mechanics, airplane and engine course.

Big Pay Opportunities in both Central and South America as well as in United States. Aviation courses taught in either English or Spanish. WRITE TODAY for further facts. State your age.

LINCOLN AIRPLANE & FLYING SCHOOL
300D Aircraft Building Lincoln, Nebraska

FOREIGN NEWS IN BRIEF

Canada

Two new branches of the Arctic air mail service are being opened by the Canadian Post Office Department this winter. The first, inaugurated on November 29, goes to Camsell River, Great Bear Lake and the other, to be inaugurated January 15, goes to Coppermine on Coronation Gulf, north of the Arctic Circle. Special cachets for the flights are expected to swell the opening flight mail poundage. Inaugural service will be on a monthly basis, but it is expected that more frequent schedules will be maintained later.

SPECULATION IN Canadian aeronautical circles concerns recent closed meetings between railway, air and defense officials at Ottawa. Rumors of early cooperation between the transport companies are based on conferences between presidents of both Canadian railways and government officials. At the same time, it is believed that some understanding has been reached for a definite trans-Atlantic commercial service, in which Imperial Airways will play a large part, and the governments of Great Britain, Newfoundland and Canada are interested.

CANADIAN AIRWAYS, Ltd., has renewed its contract to carry the mail from McMurray, Alberta to Aklavik, North West Territories. Deliveries will be made to 14 points along the McKenzie River System. The winter schedule calls for 40 trips to posts as far north as Fort Resolution, 12 to Fort Simpson and six to Aklavik.

THE SECOND annual award of the John C. Webster Memorial Trophy in the Class A competition went to P. Cox of Montreal, while Class B award (club-trained pilots) went to J. B. Neeve of the Toronto Flying Club. The awards

were made by the Canadian Flying Clubs Association as a result of proficiency tests conducted at Hamilton, Ont., recently.

THE END of the year 1934 ought to see the completion of ten or 12 landing fields in the province of British Columbia, according to Major R. Dodds, inspector of airways, who visited the territory on a regular inspection tour. At present a complete system of fields across Canada is under construction.

A NEW aviation company known as Bridge River Cariboo Airways is now operating in Vancouver, B. C., under the leadership of Neal Evans, president; R. L. Coote, vice-president, and Herb Buroker, secretary. A Fairchild seaplane, formerly owned by Pacific Airways, is being completely rebuilt at Wells Air Harbor with a new fuselage and the installation of a Wright engine.

Czechoslovakia

Plans for an airport of considerable size to be located at Ruzyn, a suburb of Prague, are being formulated. Hangars, shops, garages, a grand stand, rooming quarters and other structures will be erected.

A NEW high-wing full cantilever monoplane known as the Avia transport has just been developed. It is powered with three Avia R-12 engines, each rated at 200 horsepower. Performance of the new plane is set at 165 miles an hour, top speed; cruising speed, 142 miles an hour, and landing speed, 62 miles an hour. Provision is made for five passengers.

Germany

Fast freight may be carried by air in Germany according to reports which indicate that the German State Railways have discontinued certain fast freight

trains and plan to ship express freight in the Junkers freight planes of Deutsche Luft Hansa. Special planes, to be built by the Dornier works, will be flown in this service at night between Berlin and Koenigsberg.

EXCLUDING ITS last trans-Atlantic crossings, the Graf Zeppelin has flown, in a period of five years to September 19, 1933, over 428,766 miles and carried 17,500 passengers, 44,092 pounds of mail and 81,570 pounds of freight while making 300 flights. One round-the-world trip was made; another was to the Arctic and 48 ocean crossings were completed successfully.

Great Britain

An important step in the evolution of the ocean-going flying boat is seen in the delivery of the new Blackburn "Perth" biplane to the Royal Air Force. The new plane is powered by three Rolls Royce Buzzard water-cooled engines delivering between 825 and 930 h.p. and differs from the Iris type, its predecessor, by having a greater hull beam and better fairing in the superstructure of the wings and engine mounts.

For its armament, the Perth carries three machine guns and a 1½ pounder quick-firing Vickers-Armstrong gun mounted in the bows. This gun is said to be the most formidable of its type installed in aircraft, firing as it does, 100 rounds of 37 mm. shells per minute or five shells in three seconds.

EVIDENCE OF the rapid growth of commercial flying in Great Britain is contained in Imperial Airways' annual report. The airline reports a 75 per cent increase of traffic during 1932-33 over previous year's figures. Passengers carried during the year totaled 53,708 while ton miles flown amounted to 1,060,591. Traffic results of the first com-



Great Britain's fastest commercial plane, the Boulton and Paul Mail-Carrier with two Bristol Pegasus engines

plete year of operation of the Cape to Cairo service are also encouraging. Mail, freight and excess baggage amounted to more than 156 tons.

Italy

Italy held its first national aeronautical show at Milan between October 22 and November 5 under the auspices of the Air Ministry. The exposition was strictly national in character, intended to demonstrate the volume and extent of Italian aeronautical material production. In the eight groups of displays were aircraft engines of all types, transportation, accessories, methods of choosing and training pilots, aeronautical literature, map-making and other activities.

THE USE of airplanes for business purposes has found a ready supporter in Castelli of Milan, forwarding agents who purchased a Caproni 97 to transport merchandise to and from Venice. The interior of the plane has been specially fitted to transport merchandise in the most economical manner.

THE AIRPORT of Tripoli is assuming greater importance as airline travel between Europe and East, Central and South Africa increases. Thus far this year a number of British, French, German and Swiss planes have stopped at Pietro Manzini airport en route to Africa.

Japan

Airway beacons in Japan are being installed for night flying on the Tokyo-Fukuoka route with the first of 40 already established at Nishiura, Chita Gun, Aichi Prefecture. Another has been located at Mitsugamine Hill, north of Hazu, Hazu Gun in the same prefecture, at an elevation of 1,150 feet. The third is already under construction on Hagahiko Mountain at 1,200 feet.

CONSTRUCTION of three commercial airports has been completed. They are situated along the route of the north-eastern airway of Japan, which starts from Tokio and extends to Sapporo in Hokaido. The landing fields are at Sendai, Aomori and Sapporo. Actual flying on the route is expected to begin next year.



Caproni's newest creation, the 97

Russia

under the Chief Administration of the Civil Airfleet has opened an international competition for the design of a hangar for airships. Six prizes will be awarded, the first valued at 10,000 rubles. In addition, a similar amount will be paid for elaboration of hangar details.

According to official sources, the competition will close on January 1, 1934, and it is open to any person willing to submit plans to the Dirigeablestroy Section for Scientific Research in Moscow.

South America

Air line service between Sao Paulo and Curitiba in Brazil was inaugurated on a regularly scheduled basis offering four trips a week in each direction over the 292-mile route. One-way passenger fare is equivalent to \$24 and excess baggage is being carried at 14 cents per pound. Aerolloyd Iguassu, S. A., is the operating company.

AN AIRLINE between Buenos Aires and Cordoba is being considered by the newly formed air service section of the military airplane factory at Cordoba. It is planned to fly these planes (A.E.T.I. type) on a tri-weekly schedule which later will be extended to a daily schedule, with two trips each way. In addition to this route, the section is also planning to inaugurate air service between Cordoba-Villa Dolores-Rio Cuarto and other cities. Inadequacy of equipment is the

only drawback to inauguration of service, but just as soon as planes are made available, service will be started.

Switzerland

The Aero-Club of Switzerland, under the president of the Swiss Confederation, is organizing an international show of sport and touring aviation to be held at the Grand Palais des Expositions in Geneva from April 27 to May 6, 1934.

The club is endeavoring to offer to the aviation industries of all countries the possibility of demonstrating in a complete and absolutely neutral manner the qualities of their latest models. The exhibition was established to demonstrate the progress of aviation in general, and especially that of sport and touring aviation during recent years with an aim to increasing public interest in this branch of aeronautics and to create new markets.

Turkey

A special organization, the Administration for the State Exploitation of Air Routes, has been formed in the Ministry of National Defense for the establishment and operation of commercial air services in Turkey. The Administration is to fix passenger fares and to set postal rates jointly with the Bureau of Posts and Telegraph. The Administration's budget is composed of operating receipts and of credits to be extended, when required, from the air force appropriations of the Ministry. Overhauling and repairing of equipment will be done at military factories, and parts, supplies and material will be furnished at cost from military stores.



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CASH FOR complete floats, either Edo DeLuxe 2525, Edo 2665, or Fairchild PIA. Also Heywood starter for 165 h.p. Wright J6-5. Reply AERO DIGEST, Box 1660.

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WANTED: Lambert Monocoupe. Must be cheap for cash. Send complete description. George Vaughn, Jr., 1336 East Montgomery Avenue, Philadelphia, Pennsylvania.

WANTED: Late model Great Lakes or Monocoupe. Will consider ship needing repairs or recovering. Must be bargain. A. J. Leeward, 1225 Taylor, New Kensington, Pennsylvania.

WILL PAY CASH for modern planes, two-, three- or four-place, open or closed, any condition. State price and details in first letter. AERO DIGEST, Box 1665.

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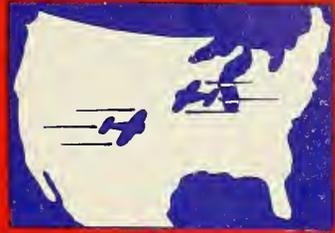
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