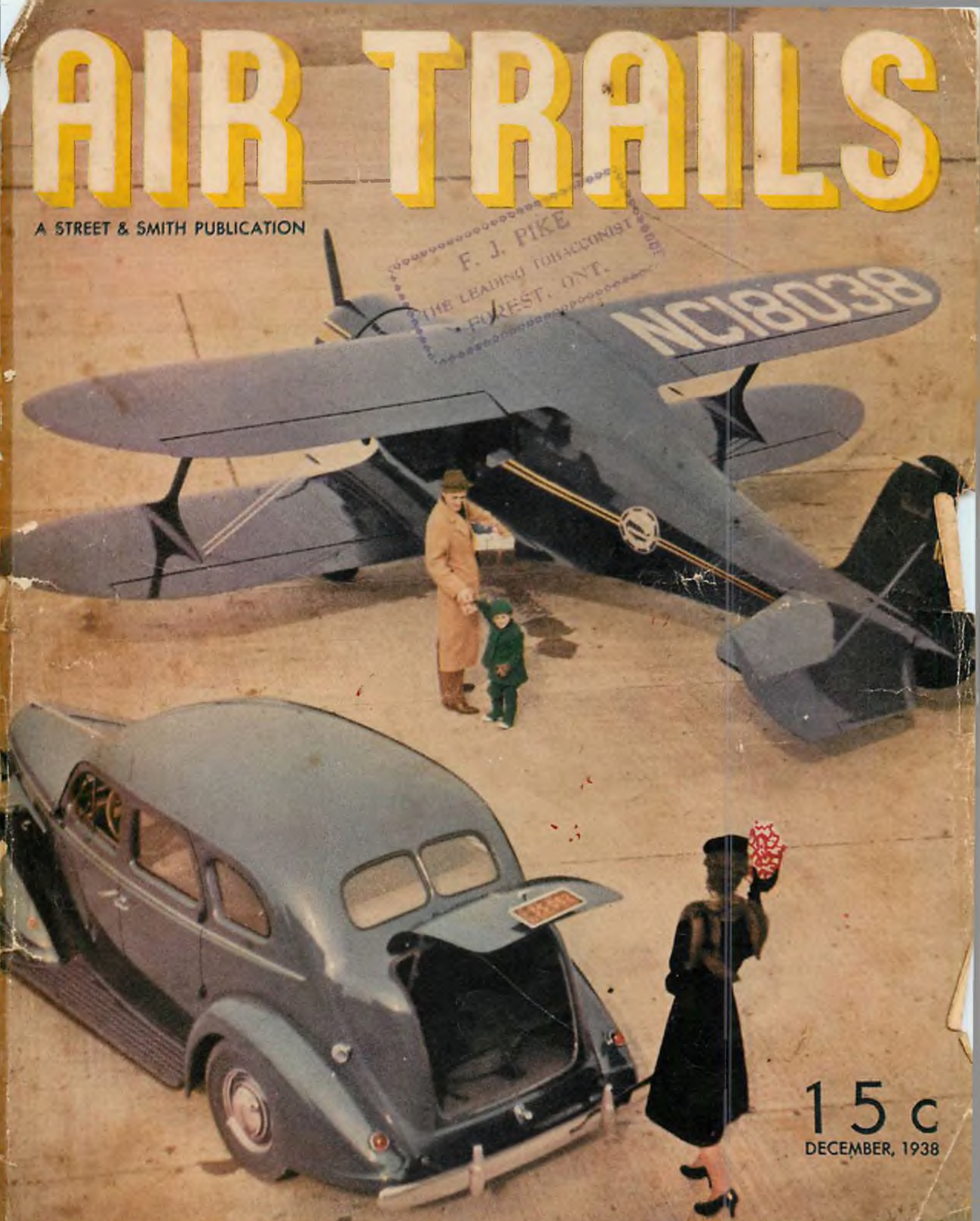
AIR TRAILS

A STREET & SMITH PUBLICATION



15c

DECEMBER, 1938

Guest Editor **JIMMY TAYLOR** ✶ **DODGING CLOUDS IN MEXICO**

PICTORIAL FEATURES ✶ **TROPHY-WINNING MODELS**

CAREER TRAINING AND YOUR CAREER

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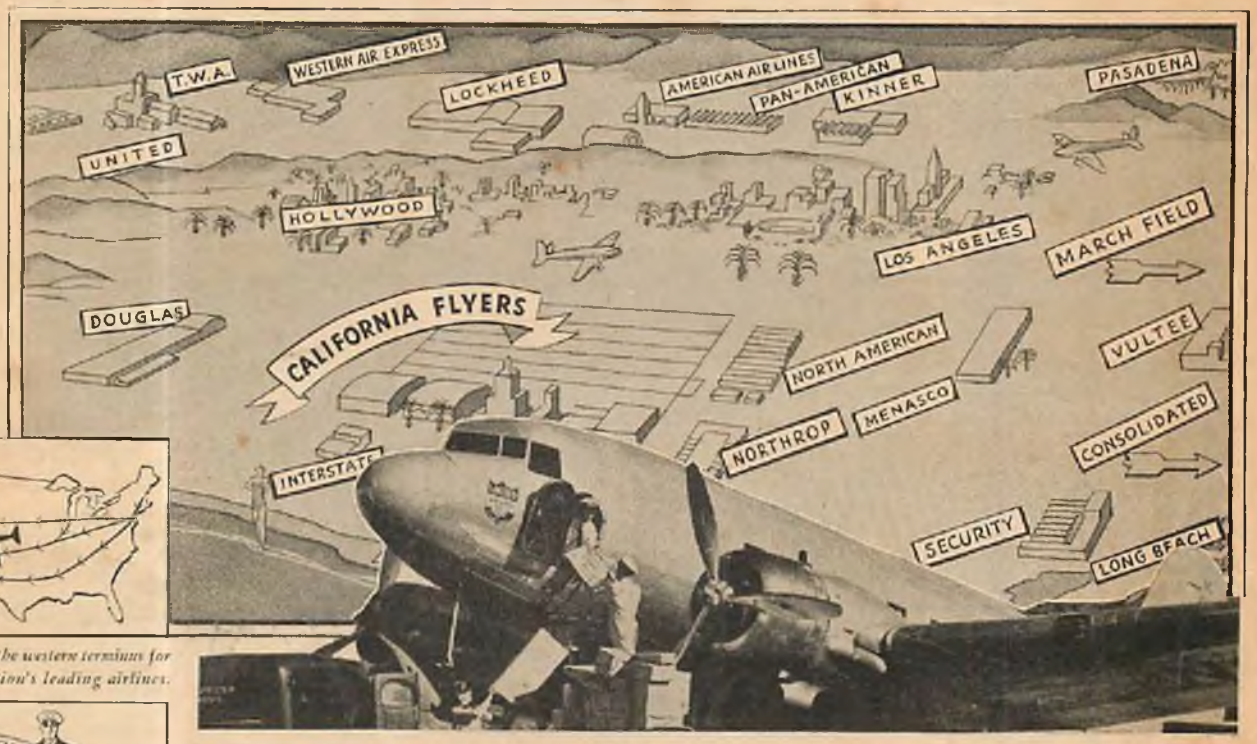

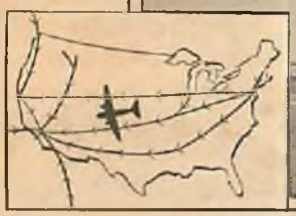

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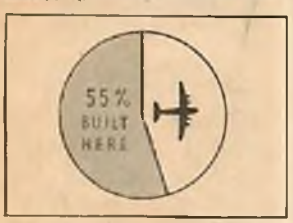

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4 months period - June 15—Oct. 15, 1938

OWNER

David G. Peterson, Wichita, Kans.

Number of flights	1010
Income from local flights	$2416.00
Income from charter flights	1080.00
Income from student instruction	46.50
Total Income	$3542.50
Fuel expense	$486.73
Oil expense	76.00
Hangar rent	40.00
Allowance for depreciation and major overhauls	500.00
Miscellaneous	18.70
Total expense	$1121.43
Gross profit, 4 months	$2421.07

David G. Peterson

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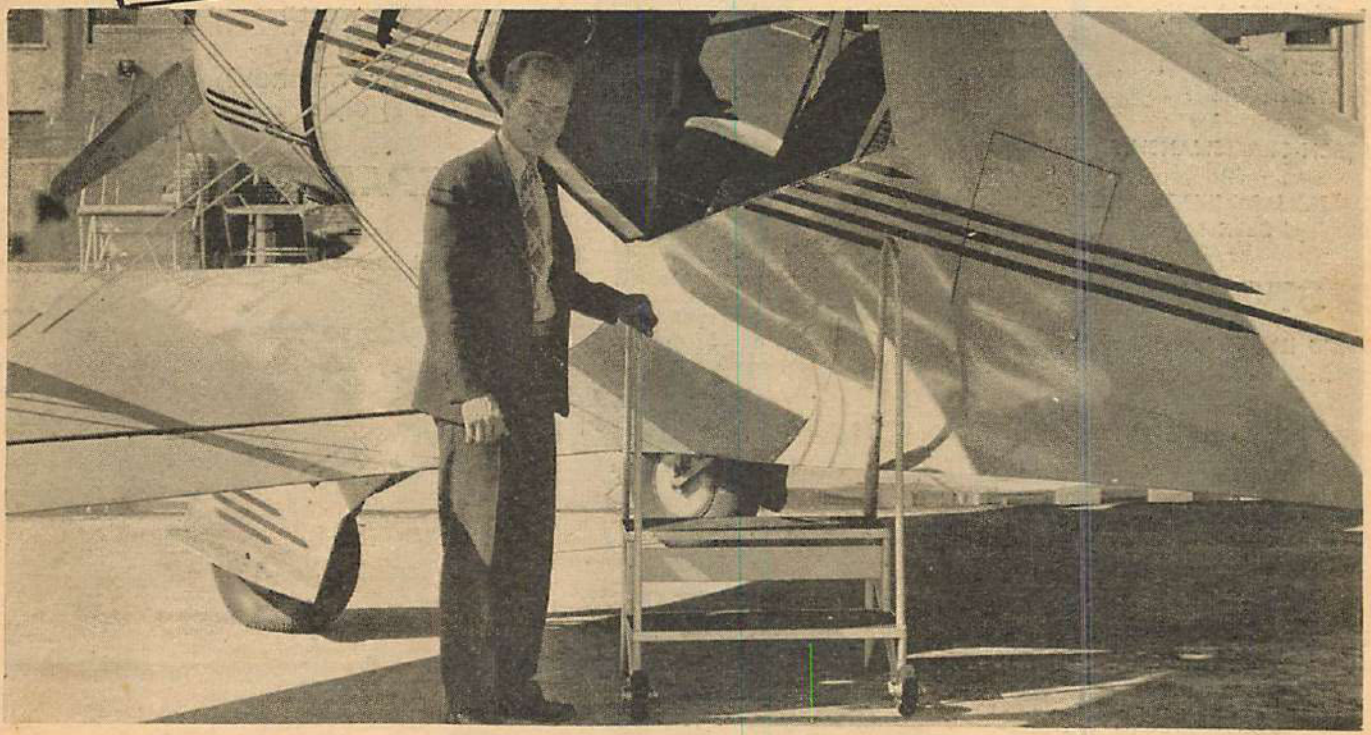
The success of Mr. Peterson's enterprise is proof that well-kept Beechcrafts are profitable investments even for operators in cities of the size of Wichita.



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DECEMBER, 1938 **VOLUME XI, NO. 3**

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"BY OUR MISTAKES WE HAVE PROFITED"

Guest Editorial

By Jimmy Taylor

Behind this ever-present smile is one of the keenest technical minds aviation has ever produced.

I like the aviation industry, all of it. Not because of any exhilaration that I get from flying, but because I know I am engaged in one of the youngest and most important businesses in the world. After twenty years of testing airplanes I still marvel at the strides being made, and I wonder what next.

The romance of testing airplanes is the romance of business, of doing something worth while, of creating and proving that which has been created is good. There is no phase in aviation that calls for more conservatism or accuracy than test piloting. That's why there are only about six top-flight test pilots in the United States today.

Contrary to the general conception, the job of a test pilot is not to abuse a new-type ship until it falls to pieces. Rather, he is extremely careful, working into the harder, more strenuous tests gradually, uncovering the weaknesses as he progresses. By the time a new plane is ready to be tested for its terminal velocity, the high pullout, it has been checked and rechecked both in the air and on the ground until the test pilot is morally certain that it will function perfectly in the vertical power dive.

There's another very important reason why the pilot doesn't fly the plane to destruction during the tests. A new type of plane, due to the necessary experiments, costs many times the amount necessary after it is in production. The cost may run anywhere from a hundred thousand to a million dollars, depending on type and material. Before the test the manufacturer insures the plane against damage. The insurance companies watch every detail and have their own engineers on hand to guard their interests.

Still another reason for handling a new ship with care is the money received by the test pilot. It may run into several thousand dollars, but he doesn't get all this for just walking out onto the field, climbing the ship into the sky for a few thousand feet, and diving it down again. Some tests run for as long as seven and eight months, with maybe a flight every week, or perhaps once a month, depending on the number of changes that have to be made. The first test is usually six to eight hours straightaway flying and a few landings, during which time the pilot is busy checking stability, instruments, et cetera. This develops any "kinks" that have to do with the handling of the ship. One of the most exacting jobs is on the motor, testing for cooling and the like. Then come special tests such as loads, stresses and ability to maneuver. The wind-up is the terminal-velocity power dive, where the ship attains her maximum diving speed with motor full on, and its ability to pull out of such a dive.

Test piloting calls for engineering ability as well as flying skill. The best stunt pilot in the world might be a washout as a test pilot. A test pilot must stunt his ship, but he must also know what happens to the ship during the maneuver.

Obviously, his reports must be honest. And the greatest single asset any test pilot can have is common sense.

The future of aviation is probably locked in the dreams of the younger generation, and it is impossible to predict with any degree of certainty what the next few years will bring forth for the industry. Planes that were marvels a decade ago are today regarded as old-fashioned, obsolete. Men who built planes twenty years ago now wonder how the contraptions they constructed ever flew at all, and pilots wonder how they ever had the nerve to fly them. Of such things has aviation been made, and by our mistakes we have profited.

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HOWARD IKE *(at left)*

The original racing plane was designed and flown by Benny Howard and always finished among the leaders. The model has a 20" wing span and is colored all white with black details. The kit is complete containing a full size plan and many finished parts. Its fast, stable flight will thrill any one who builds this model.

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ABOUT JIMMY TAYLOR

Compiled By

Tracy Richardson

For the first time in his life Jimmy Taylor has the jitters. So bad, in fact, that there's a receptionist, the telephone, and a battery of secretaries to get past before a stranger can reach him. And all, Jimmy protests, because he's not the kind of test pilot the motion pictures have been portraying recently.

Airplane testing to him is a business, and a very serious business. Millions of dollars and the lives of countless pilots depend on the ability of this ace test pilot to diagnose the weaknesses of planes before they go into production.

James Blackstone Taylor, Jr., was born in New York City on September 23, 1897. He received his schooling at Pomfort's School in Pomfort, Conn., and Princeton University. For two summers he attended the officers' training school at Plattsburg, N. Y., but when the United States entered the World War he had become interested in aviation and left college to join the naval forces.

In between jobs of "building" the naval air station at Bayshore, Long Island, he received flying instructions and was commissioned an ensign. Detailed to Miami for his advanced flying instructions, he in turn was held at that station for a period of six months as instructor in advanced flying. From Miami he was transferred to Washington, D. C., and assigned to the planning section, bureau of navigation. Practically his entire time at Washington was devoted to testing naval planes and conducting experiments with deck landing gear and catapult launchings.

Taylor's skill in flying and his engineering ability fitted him perfectly for the job of experimental engineer, and he was kept constantly employed at such work until he left the naval service in 1920 with the rank of lieutenant. He retired into the naval reserve.

Following his resignation from the government service, Lieutenant Taylor, now Jimmy, started testing planes for Chance Vought, and through the years that have followed he has tested practically every type of plane produced in America. Altogether his log book shows he has tested some five hundred different types of airplanes, and probably the most remarkable feature of his entire twenty years of test flying is the fact that never once has he had to take to his parachute, nor has he ever been in a crash he could not walk away from. Such a remarkable performance justly entitles him to be ranked with America's ace test pilots. There are about six of them.

One of the many testing jobs of Taylor was this special Grumman G-22 built for Major Al Williams.

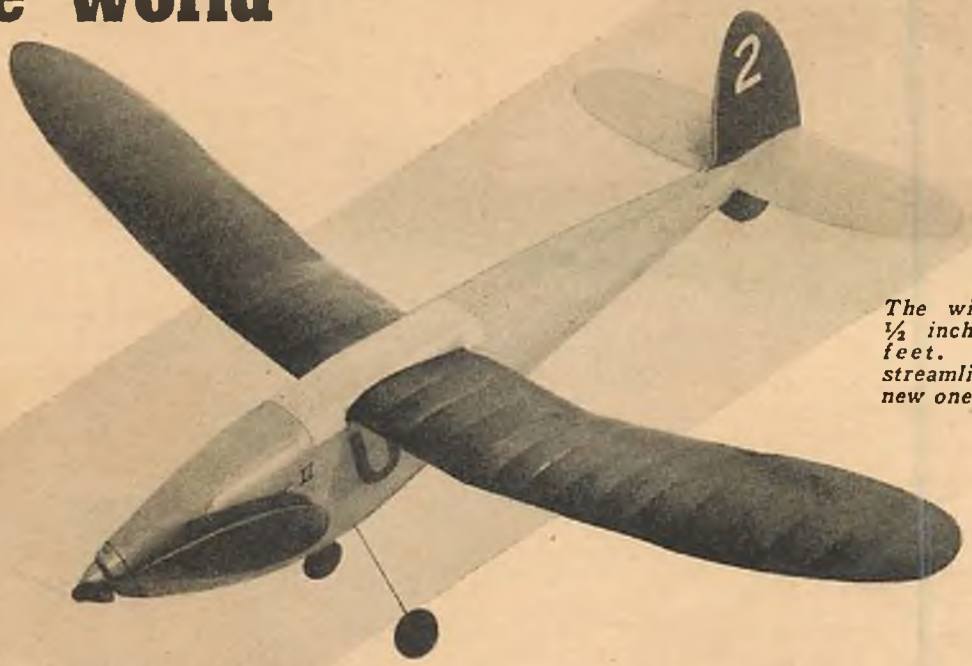
In addition to his business of testing planes, James Taylor has found time to organize "Air Associates, Inc.," of which he was the first president and is still a director and member of the executive board. He is president of the Taylor-Ainsworth, Inc., aeronautical consultants and test pilots, ready to give advice on any phase of the aviation industry or test any type or make of airplane.

He is also president of the Aviation Country Club of Long Island, associate member of the Royal Aeronautical Society of Great Britain, pilot member of the Institute of Aeronautical Science, and member of the Society of Automotive Engineers. He holds five types of pilot licenses in the United States and Great Britain.

When Jimmy Taylor puts his O. K. on a plane it's ready for production, whether it's one of the bullet-fast Curtiss or Seversky type fighters, a huge multi-motored transport, or a high-priced private job. When his diagnosis shows a weak spot they may not like it, but they tear it down and do it all over again just the same. The test pilot is to aviation what the doctor is to humanity.

WINNER

of the three most important contests in the world



The wing span is just ½ inch less than four feet. It is perfectly streamlined, and uses the new one bladed, feathered propeller.

THE WORLD'S FINEST CHRISTMAS PRESENT FOR ANY BOY. 47½ INCHES WING SPREAD—same size as the championship model designed by JIM CAHILL, Captain of America's 1938 Lord Wakefield Team. THIS MODEL WON—

MOFFETT TROPHY

America's leading yearly model competition. Jim Cahill won this event with the model pictured above. And you should win many contests by making this model from the kit we offer you free.

AMERICAN ELIMINATIONS

Against all the *best* models produced in America this year Jim Cahill won this event with this model. He was appointed Captain of the American Team and sent to Paris to compete for the Lord Wakefield Trophy.

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This is the world's most important model contest. Leading model builders everywhere enter their ships. Jim Cahill's model which is offered for a year's subscription to AIR TRAILS won the event!

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AIR PROGRESS

A Summary of Aviation News

The fastest transport in the world is the tri-motored Savoia-Marchetti. Speed is 283 m.p.h. Engines are American Cyclones built under license in Italy.

TRANSPORT

Many air-line operators are considering new safety measures which include slower schedules. After conferences with the Civil Aeronautics Authority, Ralph Damon, vice president in charge of operations of American Airlines, who has been named a group chairman, has suggested that all lines lower their scheduled speeds and fly at fifty percent throttle instead of sixty-five percent, in order to provide a greater power reserve at all times, to reduce wear and tear on engines, and to increase engine reliability.

* * *

Another device for "talking them down to the ground" in bad weather has been designed by the Bell Telephone Laboratories. By means of a green light moving across a frosted glass, air-line dispatchers can tell the exact position of approaching planes even though visibility is completely blacked out by fog or blinding rain. With this the dispatcher can talk back to the pilot and guide him in by means of the radio telephone.

* * *

Yugoslavia has bought two new Lockheed Electra ten-seaters for use on the Belgrade-Vienna route. They will be delivered in February, 1939. The MacRobertson-Miller Aviation, Ltd., of Australia, has also purchased two Electras for 1939 delivery. They will be used to speed up air mail and passenger service between Perth in western Australia and Darwin on the north coast.

* * *

The prototype of the new Lioré-et-Olivier 24-6 flying boats which was ordered by Air France for use in the Mediterranean service is now ready for final tests. In earlier tests the ship was damaged in a take-off and has been under repair since. The 24-6 weighs thirteen tons, carries a crew of four and twenty-six passengers. It will have a range of seven hundred miles and a cruising speed of one hundred and sixty m.p.h.

Air France has opened an extension of their Air Orient line to Hongkong.

* * *

The new Central Airport in Moscow is now complete. It is practically in the center of the city, and is equipped with runways nearly three hundred feet wide.

* * *

Sir Hubert Wilkins and Commander Ellsworth, on their way to the Antarctic, took a Northrop Delta and, of all things, an Aeronca aboard their exploration ship, the *Wyatt Earp*. The Northrop is to be used as a base, while communication with the ship will be maintained by the Aeronca.

* * *

The success of the German Focke-Wulf Condor and the new Junkers Ju-90 in transatlantic flights and distance flights across Europe gives rise to the general opinion that German manufacturers will soon oust American transport planes from most of the European air routes. Major Al Williams, who has seen these ships at close hand, is loud in his praise of them.

On the other hand, Captain Alfred Henke, commander of the *Brandenburg*, the Condor ship which made the Berlin-to-New York flight last summer, says that transatlantic service between Berlin and New York is not yet practical, because of the amount of fuel required, which cuts down any possibility of a worth-while payload.

* * *

It is believed that the United States War Department is responsible for the shelving of the Royal Netherlands Indies Airways plans for a Batavia-Manila air service. A ban on foreign airplanes flying over the Philippines may also interfere with the plan of an Imperial Airways flying-boat service between Hongkong and Singapore by way of the Philippines and British North Borneo.

* * *

One or two air lines are considering the use of the oxygen mask as used by Howard Hughes on his latest record-breaking trip across the continent. The masks will be made available for those who may require them at high-altitude flying.

* * *

Commercial and private aviation is now under a new government regulation. A five-man Civil Aeronautics Authority, which Congress authorized some months ago, has begun supervising mail and passenger schedules and rates and promoting safety in air travel. Edward J. Noble, a candy manufacturer of Greenwich, Conn., is chairman of the board. Harllee Branch, former second assistant postmaster general, is vice chairman.

(Turn to page 90)

NEW PLANE TEST

Largest single contract is for the seventy-[illegible] bomb-

THIS WINGED WORLD

Holt from Globe

Acme

Eighteen arrows for Uncle Sam's war bow. The members of the 27th Pursuit Squadron from Selfridge Field, Michigan, practice formation flying in their single-seater Seversky fighters. These additions to equipment of the squadron place the unit in fore of pursuit aviation.

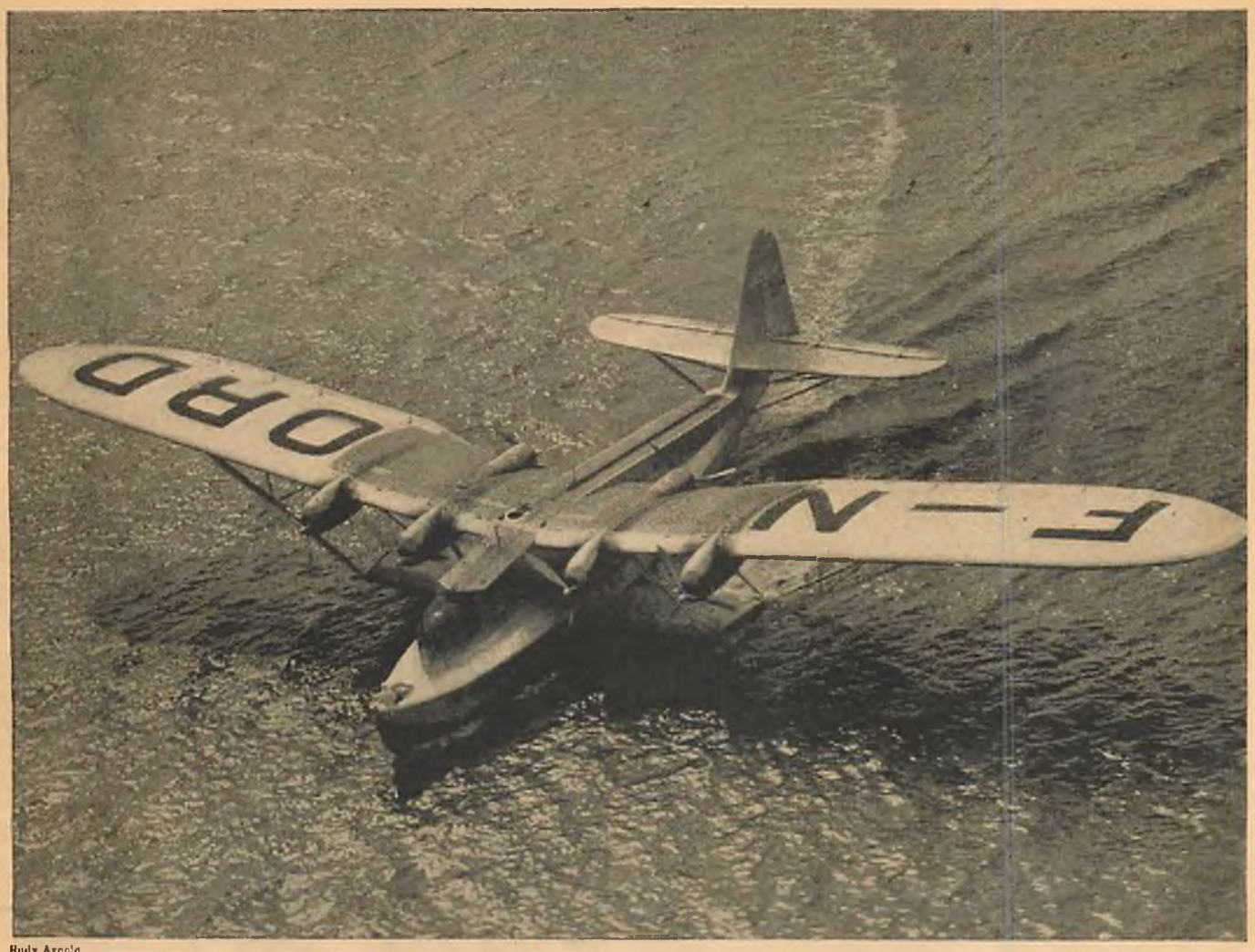
NEWS OF THE AERONAUTICAL WORLD

"This alarming little biplane," as referred to in a foreign publication, was built by Vincent Linberg. Ship resembles the "Knight Twister." It developed a speed of 170 m.p.h.

Acme

Major de Seversky in one of his famous ships before breaking cross-country record.

Wide World



Rudy Arnold

"Lieut. de Vaisseau Paris," a Latécoère flying boat to you, lands at Port Washington, Long Island, to complete the initial survey crossing of North Atlantic by Air France. The 22 hr. and 48 min. flight was made at a leisurely speed of 112 m.p.h. by way of the Azores.

PRESENTED IN PICTURES

Down the hatch! Lincoln Ellsworth's Northrop Delta being shipped to the Antarctic.

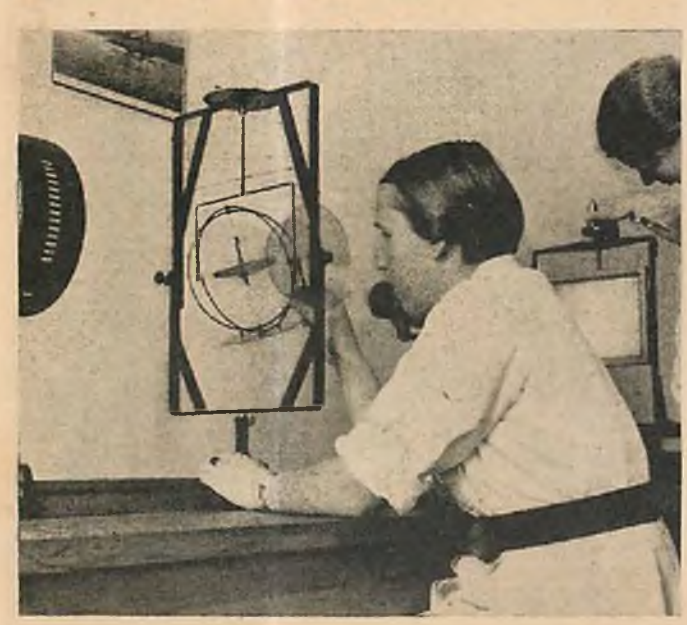
Rudy Arnold

And still another "Flying Flea," this time none other than the "San Diego Flagship," with an estimated speed of over 225 m.p.h., designed by C. C. Flagg. Span is 13 ft.

Acme

Left—A small plane to end all small planes! Poised for a hop from Le Bourget Field, France, this Simca plane, with the attenuated wings and unique rudder, is said to be world's tiniest.

Left below—Checking on the maneuvers of a plane in flight. A model plane's silhouette is matched with sections of movie of actual flight and angles of maneuver read from the protractors.



Below—Sh-h-h-h! Did you hear a plane? This instrument takes all the guesswork out of aircraft detection as employed by members of the British 32nd Battalion Royal Engineers Corps.

Bottom—Quick, Watson, the ice bag! One of the most exciting and expertly flown acts at this year's air races was this five-motored "DT's-4" flown by silk-hatted Dick Granere, in cockpit.

Right—United we stand, divided we all fall for something new in air express. Movie Quiz books delivered by First Officer Ansley Watson to pretty Olivia de Havilland at Burbank, Cal.

Below—Let me see, where do I go from here? Walter Huston and his attractive air hostess go into a huddle about something or other during a stop-over on a recent cross-country flight.

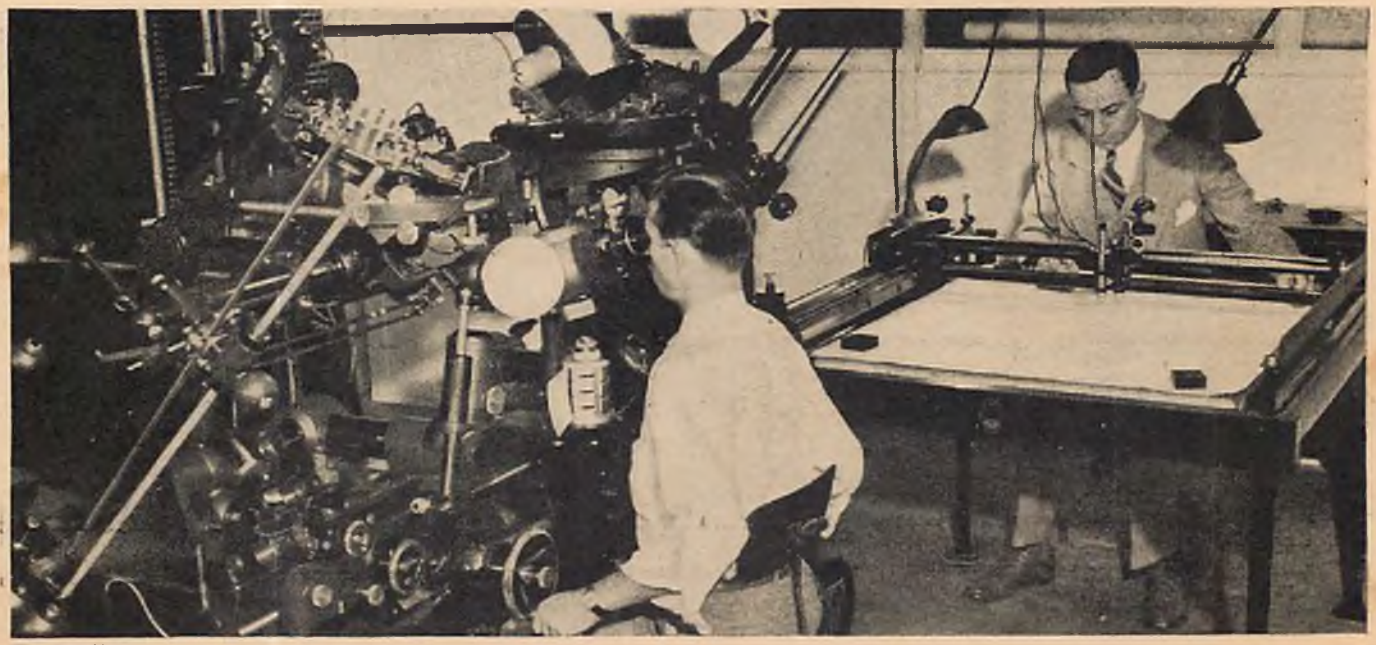
Bottom—Beginning a new cycle in aviation; in fact the beginning of several. Members of T. W. A.'s "Quarter Million Milers," air-hostess club, turn to bicycles to help keep their weight down to the required 118 pounds. All of these girls are registered nurses and know the value of keeping in trim for the exacting duties of attending to the wants and comforts of the thousands of air passengers intrusted to them.

One—The first step in this exacting profession is the taking of four simultaneous photos from different angles of the area. The special camera shown takes these exacting photos. Note the oxygen being used and the heavy clothing for high-altitude work.

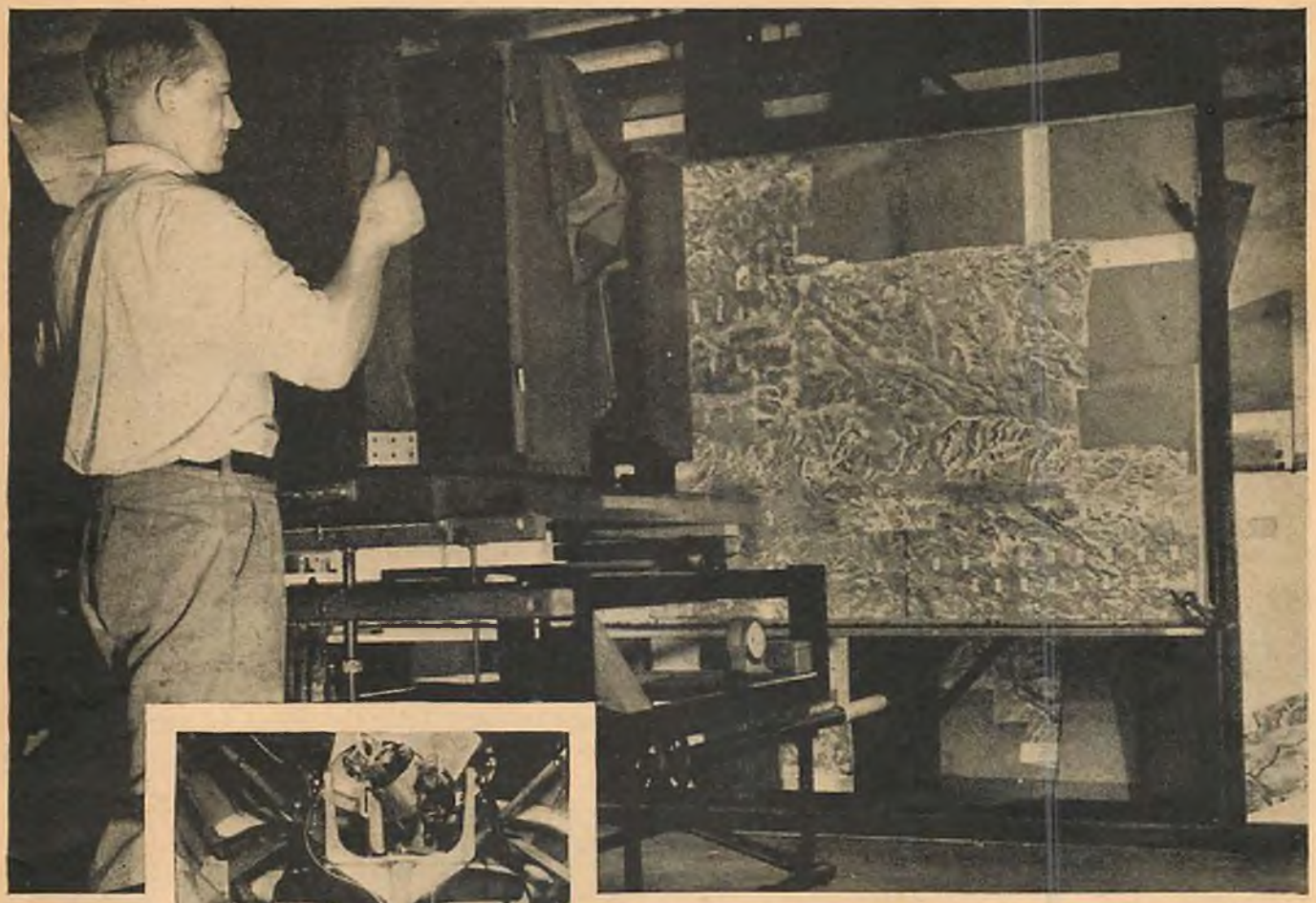
Two—These photos are carefully numbered and placed with millimeter precision upon a huge drafting board scaled with latitude and longitude lines. Skilled cartographers cut and fit the photos until the whole area is fitted like a jigsaw-puzzle.

AERIAL MAP MAKING

Four—The huge assembled photograph is placed in the complicated stereoplanigraph machine on the left being operated by C. M. Cottrell. This machine is designed to transfer the topography as shown in the huge photograph into pencil lines and curves through the medium of the machine on the right, where Frank Terpening keeps watch. From this pencil outline are composed and finished the accurate topographical maps. This method of map-making, although expensive and painstaking, has proven to be the most satisfactory.



Wide World Photos



Three—The giant assembled photograph is now rephotographed so that the joints do not show after use of the stereoplanigraph. Left—The special "polar navigator" the pilot operates to prevent zigzagging. This assures the aerial photographs being taken exactly in line.

Below—The specially equipped Fairchild 71 of Fairchild, Polley & Eliel, Inc., Photogrammetric Engineers, of Los Angeles, California, who have perfected this unique and exacting science of transferring aerial photos into the most accurate maps known.

Rudy Arnold

DODGING CLOUDS IN MEXICO

By Major Bernard A. Law

The saga of a pioneer Mexican air line, the C. A. T., whose nine lives were full of adventure.

Can I ever forget the C. A. T. air-line operation in Mexico? Not if I live to be as old as flying itself!

The line started in the spring of 1929, right smack on the tail of General Escobar's revolution. It lasted four years, then blew to bits. Some of the boys who were down there with me and are still living might be flying crates in China or Spain now. A few are connected with air lines here. But I don't know one who wouldn't drop everything and come back if that old line ever started again.

But it can't.

Only Mexican pilots today are allowed to fly in that country; and outside of the Pan-American operation along the east coast of Mexico, and a tri-weekly service up the west coast to Los Angeles, our three thousand five hundred miles of daily operation along the historic Aztec Trail, from El Paso to Mexico City, and our transcontinental route from the Gulf of Mexico at Brownsville, Texas, to Mazatlan on the Pacific, have gone back to the almost-junk railroads.

The C. A. T. Airlines (Corporacion de Aeronautica des Transportes) were washed up completely the afternoon that Theodore T. Hull dived his plane into the Susquehanna River at Sunbury, Pennsylvania. He was ferrying a new Bellanca from New York to our base at Torreon, Mexico, at the time.

But don't let me get ahead of my story—it's an old fault of mine.

When General Escobar started his revolution in the spring of 1929, I was engaged in transporting fish by plane from the Sota la Marina River in Mexico to Brownsville, Texas. Prior to that, I had been a barnstorm pilot; but like most fliers engaged in barnstorming, I soon found the pickings rather scarce. People liked to look at airplanes, but almost everyone in Texas with two dollars had already taken a ride, and had thereby become the local aeronautical expert.

When five of us were approached by the head of the International Fish Co., to put our junk planes into the service of hauling fish from a place on the Gulf coast, a hundred and fifty miles south of the Rio Grande, to Brownsville, Texas, we jumped at the chance. Pay was eight cents a pound; and the proposition seemed to promise regular meals and full gasoline tanks. So off we went.

What airplanes! We had three worn-out OX Air Kings, one OX Travel-Air, and a Ryan J5 monoplane, without brakes, it being the second job built by Ryan.

Above—The author, at Brownsville, Texas, snapped with a pilot called Slim Lindbergh. Below—Second, on Law's left, Miss Earhart, whose transport pilot's test was taken in a C. A. T. Transport.

They had never thought of putting brakes on planes up to that time. As for the other junks, the engines were at least reliable, but the ships were designed to carry only one person besides the pilot, and we had contracted to carry at least six hundred pounds of fish per trip in lieu of the hundred-and-fifty-pound passenger.

Our fishing base, as I have said, was at the mouth of the Sota la Marina River, a sluggish stream that enters into the Gulf of Mexico, and that helps form many shallow, brackish lagoons which are filled with millions of assorted fish which are attracted to this spot to fight, eat, procreate, re-create, and die.

The Mexican Indians who fish in this river paddle their canoes to the middle of it, then jump in neck-deep water and form a huge circle. Each Indian holds a part of a seine net which is a half mile long. The net holders gradually walk toward the center, closing the circle, and catching hundreds of fish; then the net is towed ashore by a power boat.

The Indians make one haul each morning, averaging about three tons of assorted marine life, including sharks, tarpons, barrel-sized turtles, enormous catfish, swordfish, sea trout, pike and redfish. What a sight that haul is! Tarpons jump twenty feet in the air, hurling themselves against the net with tremendous force. Sharks frantically dash away from the keen daggers of the Indians, who trudge behind the net trying to exterminate as many of the vicious brutes as possible. *(Turn to page 83)*

A few of the original American and Mexican crew of the C. A. T. Airlines. The Lockheed Vega shown made the initial trip from El Paso, Texas, to Mexico City. In this group are: 1 Slim Rice, mechanic in charge at Torreon; 2 Pilot Charmichael, now with Pan American; 3 Bob Ewalt, recently killed; 4 Harold Bromley, now inspector, Air Commerce Bureau; 5 Bill Woods, mechanic; 6 Major Law, Superintendent of Operations; 7 Lloyd Anderson, recently killed; 8 Paul Scott, recently killed; 9 Harry Gorman, now with American Airlines; 10 Pilot Woodson; 11 Garrett Sullivan, operations office. Pioneers of Mexican aviation!

Mechanic Al Hedberg acts as traffic cop to halt one of the peons always in the middle of the field when planes came in for a landing. They never learn.

A cargo of well-known personalities. Left to right—The American Consul, Mrs. Parks, the author, Will Rogers, Hal Roach, and Erick Pedley, just after landing in the Whirlwind Travel-Air, after their first flight to Mexico via C. A. T. Airlines.

There's something fishy about this—in fact 600 pounds' worth. One of the old OX Air Kings used in the daily transportation of Mexican fish.

WIND IN HIS WHISKERS

By ROBERT HOGAN

DEAR MOM:

You probably been wondering why you haven't got a letter from your wayward son for so long. A lot of things been happening between my airplane and a girl named Jane and her old man and a couple of laundries.

First, I'll tell you about Jane. She's a regular, mom—with blond hair. And she's little and cute with the right kind of camber in the right kind of places. Anyway, the first time I laid eyes on her, I knew right off that we were going to get along, only I didn't know it was going to be so tough to get started.

I guess you haven't heard from me since I told you that everybody around that hick town of Centerville had been asked to ride in the old ship and most of them had turned me down. It was getting time for the old airplane to be re-examined by the Department of Commerce inspector and I wanted to get in as much flying as I could before then, because she sure wasn't going to pass this time. She needed new covers and the spars in the wings were about falling off from dry rot.

I heard Maywood sixty miles away was a wide-awake little town of about five thousand, so I shoved off. I found the local airport, all grown up with about ten years' worth of weeds that had got a good start since the city fathers dedicated the field in the name of Charles Augustus Lindbergh like about ten thousand other towns had done, and set the old ship down on a Friday afternoon, figuring I'd start business along about Saturday morning and have the week-end to get going strong. Well, it rained Saturday and Sunday and I don't mean drizzled. The river that ran along by the side of the field backed up and covered the field by Monday night, and there I was with a crate that needed condemning and me needing money and the rain still pouring down.

Meantime, I found a garage man that was still sort of lukewarm about aviation and I kind of got to know some people around town, good and bad, among which was Jane. She was one of the good ones.

Well, mom, after about two weeks of hanging around—I was broke by then—the field dried off enough to fly off from and I warmed up the old engine and took off to give the citizens of Maywood some aerial thrills such as vertical banks and stalls and stuff—you know, to make them air-minded. When I came down, Jane Hand was out at the field waiting for me. But you know me, mom, business is business, and I made her wait until I took a couple of dollar passengers up for a ride and collected. Then, it being lunch time, I knocked off and Jane and I went in town and spent the two bucks.

There's a bright girl, mom. You'll like her. She had a swell idea for helping me in my business. She said her father ran the laundry in town which he had started from nothing and built to something that was in the dough, putting two other laundries and a whole flock of wash women out of business on the way up. She said she'd bet I could talk the old man into having a bunch of handbills printed and pay me for dropping them in the neighboring towns for advertising. To top that off, she invited me up for dinner that night, which sounded very good, because having spent the two bucks at the local hotel for a swanky lunch and not being sure whether I'd get any more customers in the afternoon, I wasn't very sure where I was going to eat that night. And of course I liked to be with Jane, too.

Two birds at once, that's me.

Well, mom, I met her old man and I didn't know whether I liked him or not. He was kind of stiff with a pretty good opinion of himself, like most self-made men, and he had a goatee—you know, mom, that's whiskers with a haircut—and he'd kind of look at me and pull on his beard like he was thinking, I don't like the looks of this young daredevil and I don't like the idea of his traveling around with my daughter, which I found out afterward that he didn't.

We were about halfway through dinner when Jane said, dad, Windy's got a perfectly wonderful idea for doubling your business, haven't you, Windy? Which I said I had and the old man—his name, incidentally, is Horace Hand and he runs the Hand Laundry by machinery—looked at me like he was going to laugh because I could tell he didn't think I ever could get a good idea anyway. Well, you know me, mom. Everything in its place. So I says,

perhaps it would be just as well to refrain from talking shop until after dinner—this because I was hoping if he ate more food, it would make him feel better and I knew I'd feel better because from the looks of things, this meal might have to last me some time—which it did.

With all that fried chicken going inside of me, I began to get plenty of nerve and this handbill idea was growing to what Ezra Wheeler, who you *remember ran for* Congress back home, used to call astounding proportions.

You see, mom, this handbill stunt was all right, but it wouldn't last because any minute one of those Department of Commerce inspectors was going to romp down on my neck and tell me to junk that ship or rebuild it. What I needed was money for the ship and money for me and what I hoped Mr. Hand needed for his laundry was plenty of advertising so he could branch out.

So when we got into the living room and Mr. Hand had pulled twice on his whiskers and coughed, I says:

Mr. Hand, I've got an idea that I think will triple your business. I've had a lot of time to look around Maywood and I've seen a couple of other laundry trucks in town from outside cities.

I could see that kind of hurt because his face inside the whiskers was kind of red, so I didn't spare the horses. I just jumped in with both feet.

These outside laundries are hurting your business, Mr. Hand, I says, and you can't deny it. Well, he kind of froze up and his face got sort of white now and he wanted to know what I knew about it, meaning, I guess, that it wasn't any of my business.

Anyway, I says, what you got to do is fight back. Now I got an airplane. We can paint that ship up all nice and shiny and letter a big laundry sign on the side of it which says Hand Laundry of Maywood, it all comes out in the wash. And then we'll have thousands of handbills printed and every day I'll fly over the towns and cities around Maywood and drop the handbills telling the citizens how much better your work is than the others and how much cheaper.

The cost of this, Mr. Hand, I told him, won't mean anything to you. I'll sell you my ship for five hundred dollars and it'll take about another five hundred to put her in tip-top shape and paint her and I'll fly her for you and make my own living by carrying passengers in her.

Of course, you know me, mom. I wouldn't cheat a guy in the world. I could have told him that the old crate was in perfect condition and let him find out about the extra expense when the D. C. inspector came around any day now

(Turn to page 96)

He said he was coming in and no upstart was going to stop him. Then he touched the electrified fence!

Observation is the most unpublicized branch of military service—a re

MILITARY AERONAUTICS

Probably the least publicized branch of military aviation is that known as observation, and yet military aviation was based on the efforts toward observation as carried out by the early World War pilots. When the airplane was first accepted as a military weapon, it was presumed that it could be nothing more than an additional piece of equipment for the cavalry, whose duty it was to penetrate hostile country and scout for information. Indeed, as has been explained in a former article, no one at first ever considered the plane as a fighting weapon, an instrument of attack. Such a flimsy, frail piece of mechanism could only be used as a mobile aërial platform, from where an experienced officer-observer could attempt to penetrate the enemy lines and gather information, presumed to be of some value to the staff.

For this reason, in the early days, the observer was always a high-ranking officer, whereas the pilot was usually a skilled N. C. O. This system was in vogue in the German air service throughout the War in two-seater squadrons. To go further, the writer has had the experience of commanding a six-ship flight of two-seaters doing certain observation work on the Western Front, when

view of its tactics and operations.

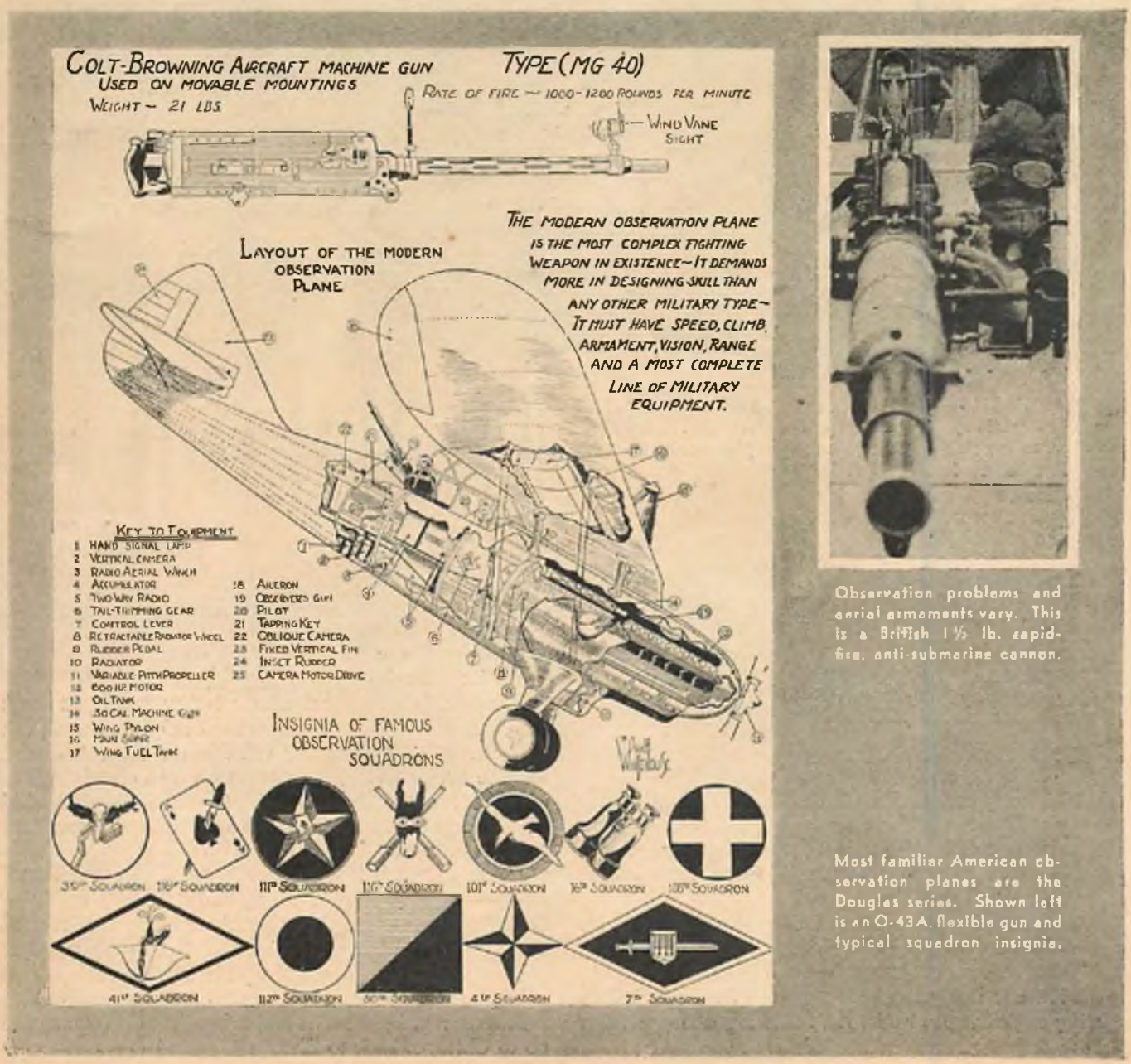
by Arch Whitehouse

at the time he was only a corporal observer. My pilot was a captain, a flight-commander, but owing to my seniority in air time, I was ordered to take full command of the patrol on many occasions, and needless to state, I enjoyed to the full the authority vested in me.

Observation is one of the most important functions within the jurisdiction of military aviation. In the old days the first rule we were taught was that we were the Eyes of the Army, and they never let us forget it. Observation, so they tell us, saved the German navy at the Battle of Jutland. Observation enabled the British army to win the Battle of the Somme in 1916. Most certainly, observation brought victory in the Battle of Cambrai and no one can deny the value of the systematic observation flights carried out by British and American aero squadrons during the latter part of the World War. In the writings of recognized German military experts, the point is brought up time and time again.

American Air Service observation actually began as far back as July 1, 1907, when an aeronautical division of the Signal Corps was established. About a year later, the Wrights fulfilled a contract and turned over a military machine to the army, and for a period of more than two years experimental and research work was carried out, but owing to the lack of funds and an official appreciation of the value of the airplane, American military aviation lagged, so that at the outbreak of the World War in 1914 there were less than fifty airplanes available, all of which were obsolete and fit only for training purposes.

Today, no military power worthy of the name ignores observation aviation. It has revolutionized ground warfare because it has practically eliminated all possibility of hostile forces meeting, in the accepted sense of the phrase. Observation aviation secures valuable information not only for the ground forces but *(Turn to page 91)*

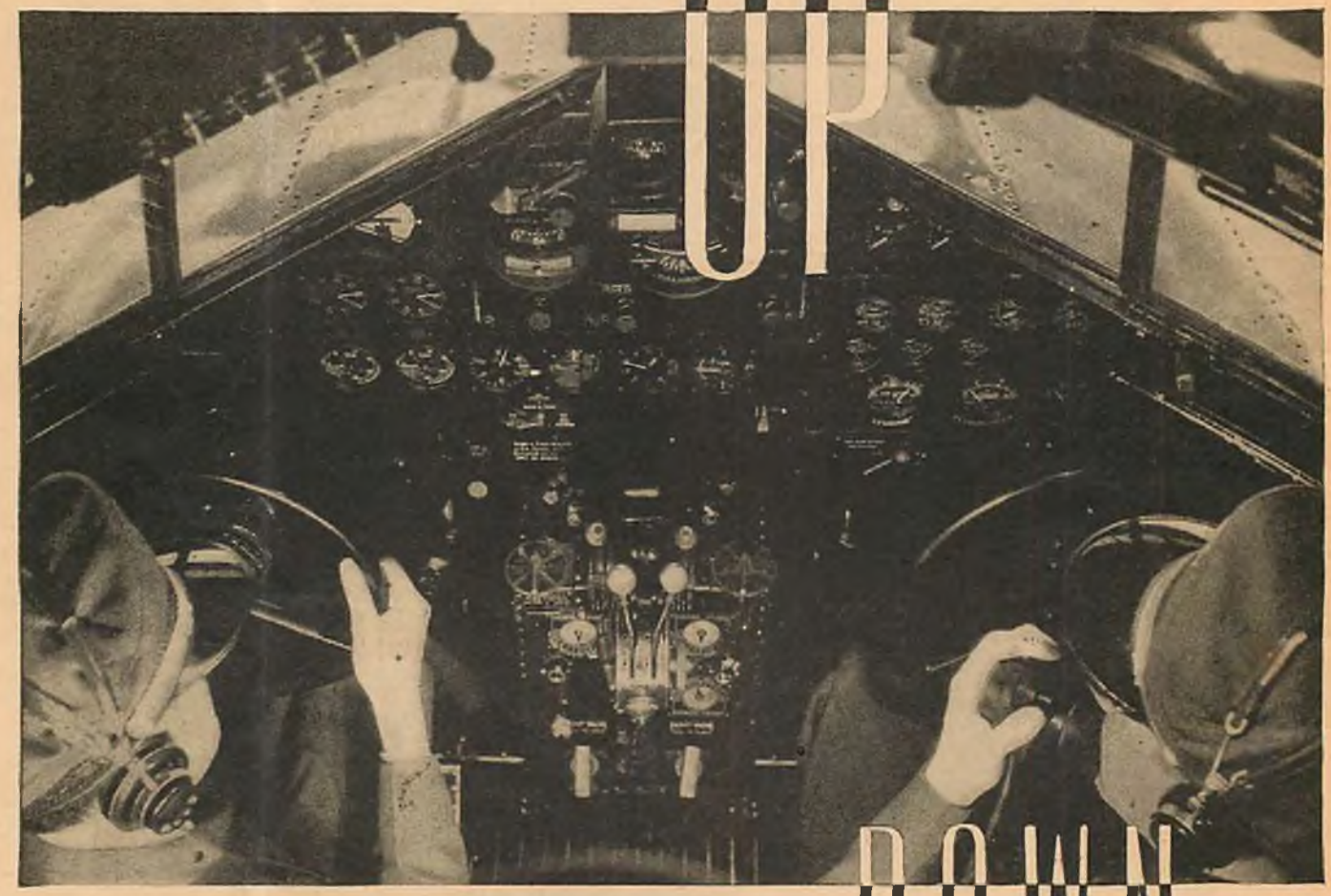


Observation problems and aerial armaments vary. This is a British 1½ lb. rapid-fire, anti-submarine cannon.

Most familiar American observation planes are the Douglas series. Shown left is an O-43A, flexible gun and typical squadron insignia.

An exclusive feature by the captain of a huge luxury-airliner of T. W. A. tells how they get 'em up and down.

UP AND DOWN



From the myriad of flight, navigation and engine instruments before them, the Captain and First Officer of the giant T. W. A. transport can check on any part of the ship, her power plants or air position.

TAKE-OFF AND LANDING PROCEDURE
FLITE 10, LEAVING KC AT 8:25 AMC
ARRIVING CG 10:47 AMC

CREW: CAPTAIN RICHARD HANSON
FIRST OFFICER RAY WELLS
HOSTESS ALLEN

TIME: 8:10 AMC

I take my place in the pilot's seat after putting my name plate in the holder on the rear side of the cabin door. First Officer Wells is already in his place and Hostess Allen is getting things in shape back in the cabin for the trip to Chicago.

After I get squared away in the seat and place my kit with my flight plan, flight log, calculator, speed charts, etc., in the side pocket where it is easily accessible, I ask Wells if he is ready to check the list of controls before starting engines. As he is, the following dialogue takes place:

Wells: "Seat belt and smoking sign."

I turn them on and answer, "Both on."

Wells: "Parking brake."

Checking the brakes, I reply, "Parking brake on."

Wells: "Check all radio."

Hanson: "O. K., I'll check the two-way and you check the other receivers." I put on the headphones and push the microphone button and call Kansas City: "Hanson in Flite 10, Plane 358, to Kansas City, go ahead."

KC: "KC to Hanson in 358, O. K., the surface wind is southwest 15, Kollsman 29.92 and the time is now 8:14 and 20 seconds."

Hanson: "O. K."

Wells: "The W-4A, 17-A, and loop are operating O. K." (These are the other three radio receivers he checked.) "Running and warning lights—night only."

Hanson: "They are off." (It is daytime now.)

Wells: "Check fuel."

Hanson: "Six hundred and ten gallons." (Enough to go to Chicago, back to Kansas City and *(Turn to page 74)*

To be first has been Man's pride, and the foundation of an industry.

MEN WANT SPEED

BY EDWIN LAIRD CADY

It is man power which makes the air express. Human pride and human vanity. Hunger to be the swiftest.

Since its inception, the express business has hummed with the pride of speed. Foam-lathered horses and rocking stagecoaches. Blue-ribbon steamships. Express trains. Speed—speed—always speed. The fastest package transportation in the world.

The airplane was a challenge not to be overlooked. Get up overhead. Soar above the slow, puffing grades and the wide, time-eating detours. Go as the crow. Here is a faster way. Use the quickest.

In 1919 the Railway Express Agency tried it. A Handley-Page plane, heavily loaded with express, took off from Mitchel Field, Long Island, for Chicago. Heavy headwinds forced it down near Mount Jewett, Pa. But a start had been made. Another flight was tried, and another.

By 1927, air express was a regularly organized system. It has built up from there. It is building up right now. It holds the banner—the fastest package transportation in the world.

The men who made air express possible also made it simple. To send a package, just wrap it with ordinary care, mark it "air express," and take it to any one of the twenty-three thousand railway express offices. If this is done in an airport city, the package will be taken directly to the flying field. Otherwise it will travel by rail to the nearest airport city. Then up in a plane, to travel eight hundred miles in four and a half hours, or twenty-five hundred miles overnight, or coast-to-coast in fifteen to seventeen hours. And thirty-seven thousand miles of regular-service air routes, joining at least two hundred and twenty-five airports, are ready for any package.

In most cities it is not even necessary to take the package to the express office. No charge is made for special pick-up and delivery, including Western Union messengers at odd hours and on holidays. Fifty dollars' worth of insurance is free. And the expressman will hand out a timetable showing the routes between the home airport and major cities, the transfer points, the time taken, the air lines used, and the rates.

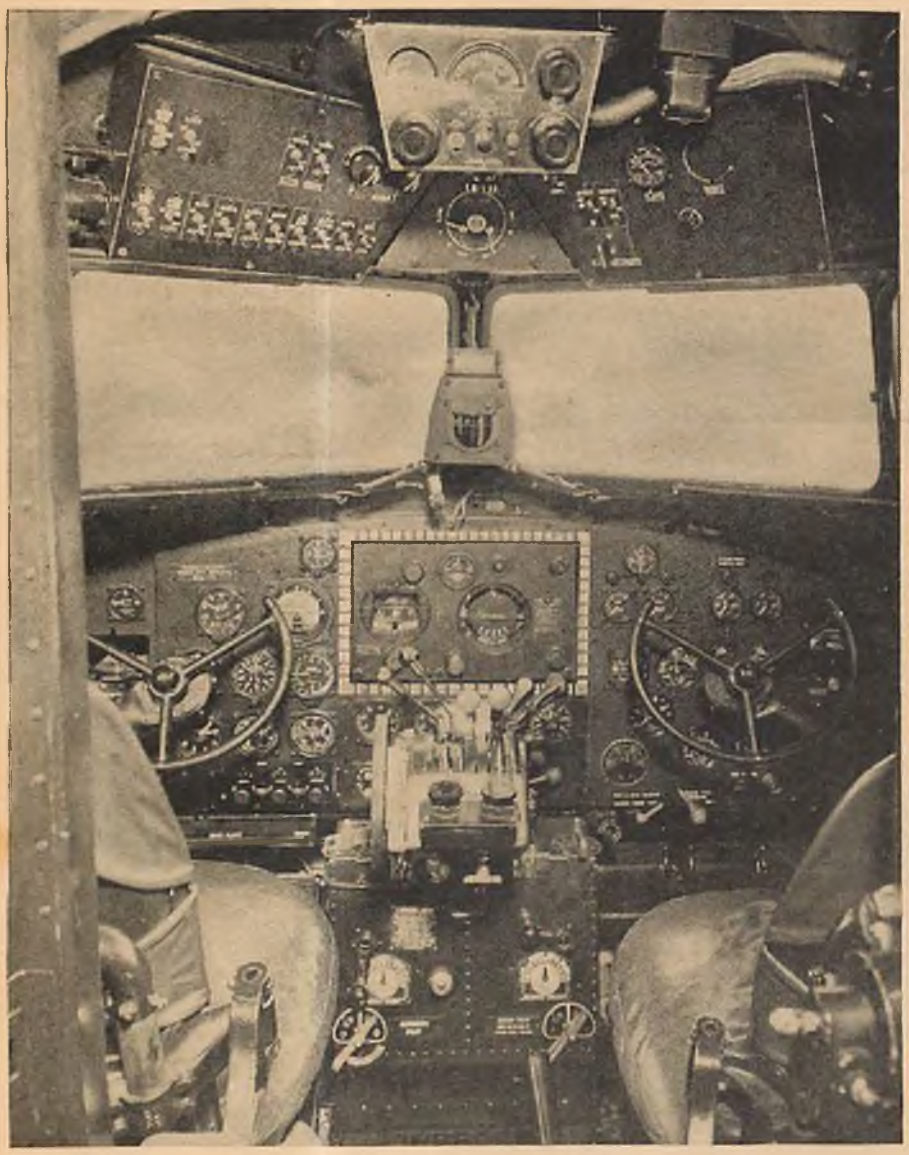
Rates have been reduced at least two thirds

(Turn to page 76)

From such an humble beginning as above, when the first air express left the ground, grew a vast network of package-carrying air lines.

GYRO-PILOT

By **William Winter**



TWENTY-NINE years ago Sperry installed the first gyroscope ever used in an airplane. A report of the day states: "As a result of the use of the gyroscope, the most powerful wind gusts could not tip a Beach monoplane suddenly in flight."

Nearly three decades later three Flying Fortresses droned out to sea on what seemed, at least from the matter-of-fact manner in which the mission was accomplished, a routine assignment. Their goal was the liner *Rex*, a moving pinpoint some 700 miles out on a 4,000-mile featureless plain of water. Flying blind for most of the way, the three ships burst simultaneously out from a wall of cloud. There before them was the steaming *Rex*. Conceive, if you can, an objective the size of the Mayo Brothers' clinic at Rochester, Minnesota, which is traveling east, a base in New York City from which you must strike, flying blind, the objective at a point near Chicago where it has moved during the time of your flight. That is navigation.

From that first early day when some intrepid airman hung a plumb-bob from his crate for a turn-and-bank indicator to this modern age of precision, all-weather flying is a Gargantuan leap. In no other science but aviation has the rapidity of development so emphasized the fact that necessity is the mother of invention.

Welding technique, then all-metal construction, stressed skin, flush riveting and what have you, the 1,000 h.p. and more recently the 1,500 radials have shoved up cruising speeds, payloads, passenger comfort, range and every other attribute of an honest-to-goodness airliner. From the Ford "Tin Goose" to the DC-4 in seven years is the measure of progress.

That adequate instruments were available in time to keep pace—more correctly they permitted progress in the air—was fortunate for modern aviation. Therein lies the story of Sperry; that of a simple and fortuitous gadget, the gyroscope; and a generation's span of foresight and application.

Specifically, the need for an automatic pilot came about because pilots and co-pilots were overburdened with the flight details of navigation, observation and radio communication. In fact, fatigue constituted a danger toward safety in the air, particularly under blind-flying conditions when the combination of long-period manual operation of controls and the concentration on instrument readings detracted considerably from the pilot's efficiency to react

to an emergency. The automatic pilot would enable long-range, over-water flights to be made with an insurance of conditions important to accurate celestial navigation. (The automatic pilot has proved to be capable of steering a course to within fractions of a degree, or appreciably more accurate than the best results obtainable by manual control.)

Then, too, manual control by even a veteran of many thousands of flying hours cannot control a craft in even moderately turbulent air with enough ease and smoothness to avoid unpleasant sensations on the part of passengers. If you have flown in a modern transport on a gusty day you can readily detect the difference between the human and the automatic pilot. The one is slow to react, overcontrols, permitting the ship to yaw and dip; the other is perfectly correct and smooth on the turns.

Blind flying on instruments was possible before the automatic or gyropilot. For the gyropilot is nothing more than the combination of the directional gyro and gyro-horizon, two instruments already sold by the thousands.

The directional gyro affords an accurate index of turn. It is not affected by rough air or magnetic disturbances. It does not lag or oscillate.

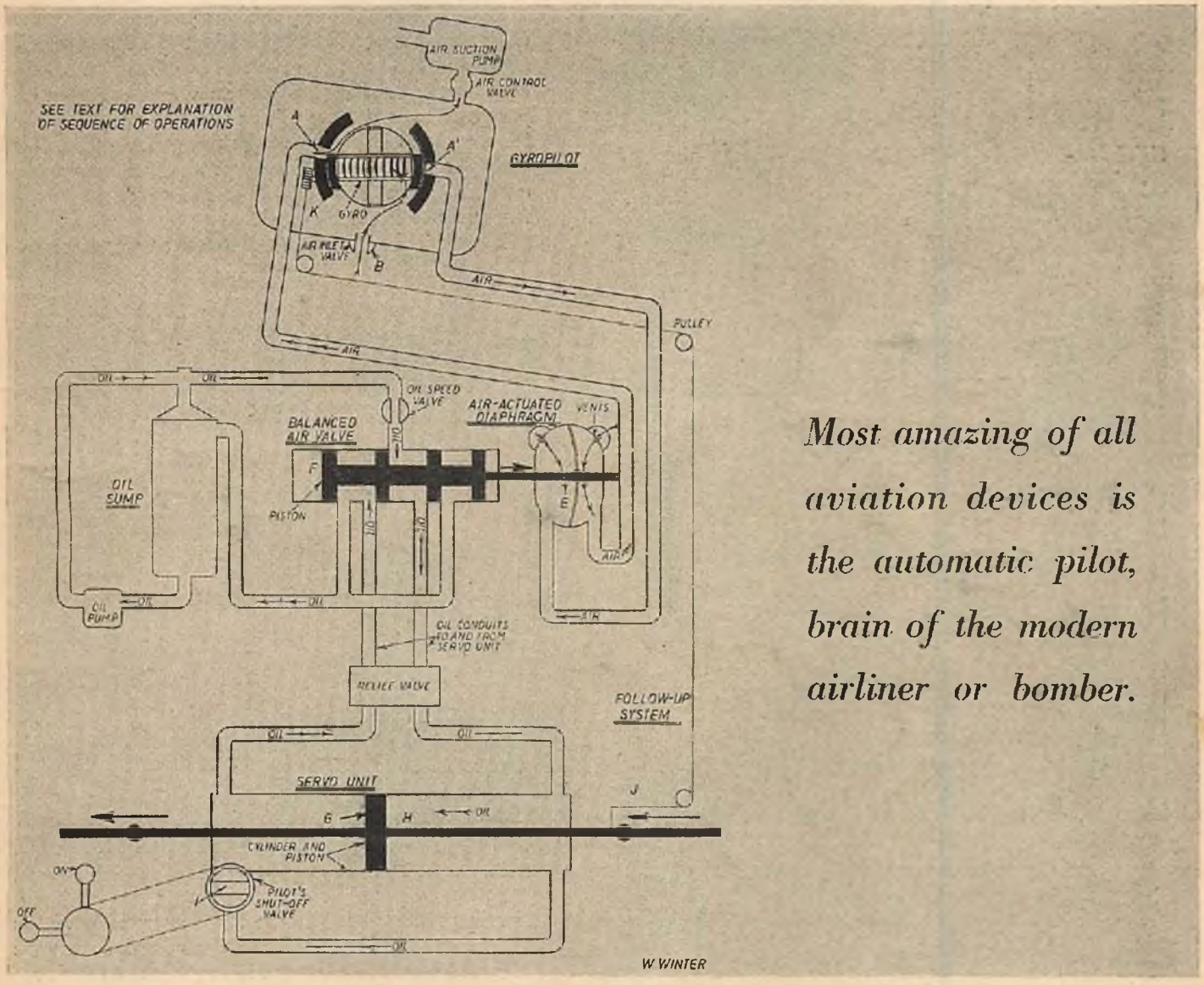
The gyro-horizon enables the pilot to know, when flying blind, the angular position of the plane in relation to the horizon.

The happy incorporation of these two instruments into one unit, modified to convert their accurate indications into corrective movements of the controls, is the gyropilot.

The gyropilot must be capable of detecting immediately and applying proper control to return the ship to an even keel from a displacement about any, or all of the three axes—that is, longitudinal or rolling, vertical or yawing, spanwise or nose up or down. To accomplish this the instrument utilizes two gyroscopes—one in each of its basic components. One is mounted with its axis parallel to the nose-tail or longitudinal axis of the ship. Should the plane yaw from the direction of flight for which the particular gyroscope was originally set, the resistance of the whirling gyroscope to displacement from its plane of rotation actuates, through mechanism, the control to return the ship to the desired course.

Another gyroscope, mounted with its axis of rotation vertical to the ship in level flight, corrects all the displacements which aileron and elevator control take care of.

(Turn to page 82)



Most amazing of all aviation devices is the automatic pilot, brain of the modern airliner or bomber.

MEMBERS of the flying fraternity have watched Beechcraft airplanes advance from a position of obscurity to one of the most prominent places in the private aircraft industry, during the space of the last few years.

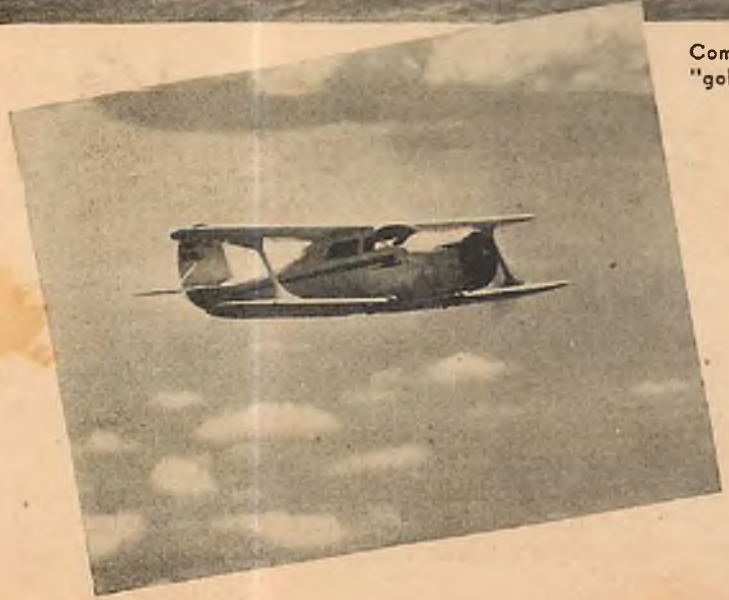
The story of this plane officially begins in 1932, when a company was formed to produce it. However, the fundamental highlights go back much further, being found in the background of the man who conceived the ship, as well as many others, Walter H. Beech.

The story behind the cover—Beechcraft's meteoric rise to popularity.

A thumbnail sketch of Walter Beech's aeronautical experience would reveal that he served with the U. S. Air Corps for three years during the World War. After the War he did barnstorming for several years, then joined the Swallow Airplane Company, makers of the first commercial plane, as test pilot. In 1925 he organized his own Travel Air Company, which under his direction manufactured the first *steel-tube* commercial ship, and developed into one of the world's largest builders of commercial aircraft. Following a merger of this company with Curtiss-Wright, and a two-year period as sales executive, Mr. Beech decided again to enter business for himself, and shortly thereafter organized the Beech Aircraft Company in Wichita, Kansas.

The entire first year was spent in experimental engineering in a successful attempt to incorporate in a plane of new design, features of safety, speed, economy in operation and greater load-carrying capacity. Development work was carried on in Wichita for a period of approximately two years, and in the early part of 1934, commercial production commenced on these planes, now known to the public under the trade name of Beechcraft.

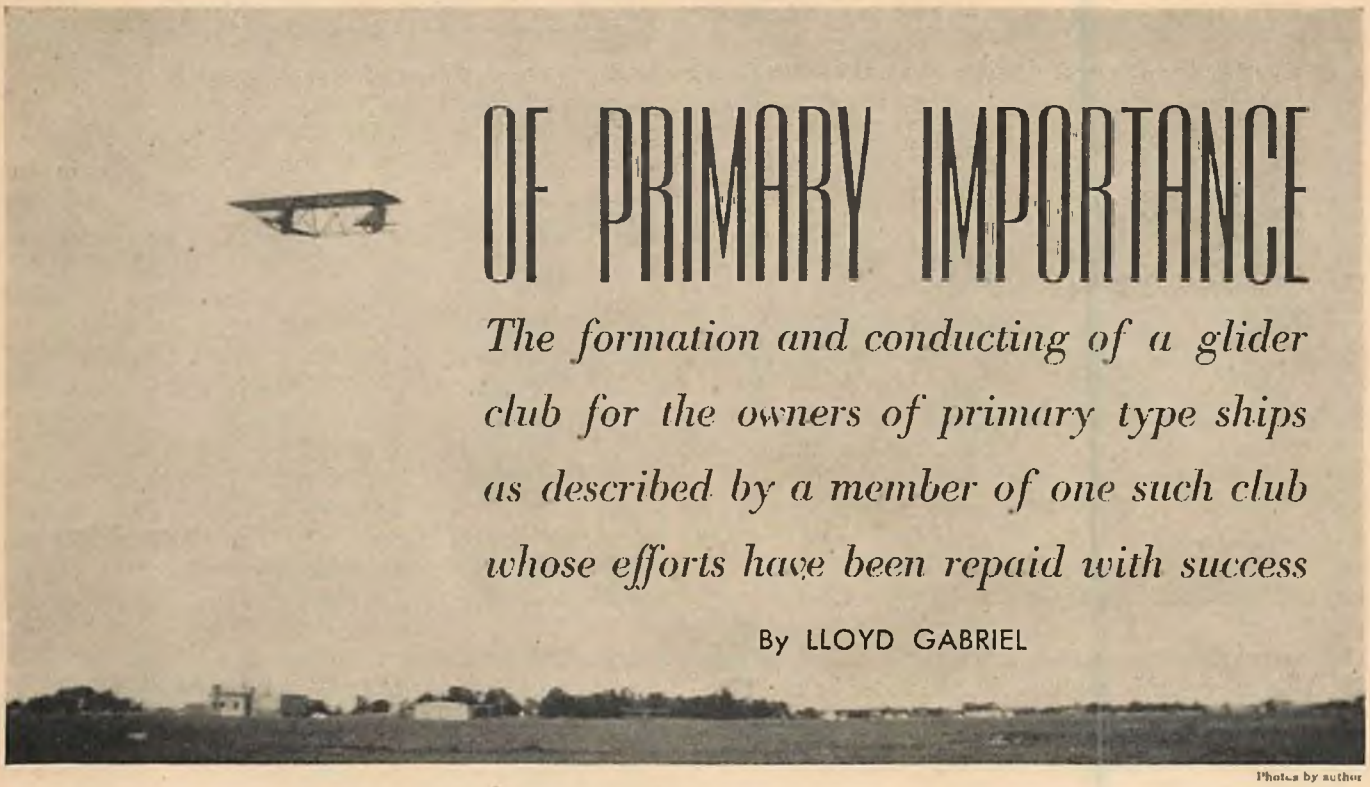
Every phase of Walter Beech's aeronautical ex-



Coming at you! The Beechcraft 18 on floats intended for the "gold country" of Canada. Left—The Jacobs-powered biplane.

perience played a part in the construction of the first Beechcraft. From his days in the army he learned much regarding the requirements for ruggedness and reliability which should be incorporated in airplanes. His barnstorm flying, out of all sorts of fields and in all kinds of weather, gave him a firsthand view of the conditions which airplanes would meet in the hands of their owners. The design angle of experience is covered by the fact that under his direction a total of eighty-two airplanes have been designed and granted Approved Type Certificates.

The Beechcraft biplane is characterized by an unusual arrangement of the wings. It is the only airplane made today that has the lower wing in front of the upper wing. This construction *(Turn to page 93)*



OF PRIMARY IMPORTANCE

The formation and conducting of a glider club for the owners of primary type ships as described by a member of one such club whose efforts have been repaid with success

By LLOYD GABRIEL

Photos by author

It has always been my contention that glider centers and large clubs well under way are quite capable of taking care of themselves, but what of the small groups of glider enthusiasts of limited means?

They may be small and unimportant and not have the facilities of such places as Elmira, but they are, nevertheless, the nation's big recruiting agents for the glider movement. These are the organizations that need the coaxing or coaching, the advice and the help.

The members concerned are not going to invest a lot of money in something radically new until they have found a practical solution to suit their particular locality. In cases like this, cash is premium and you will *not* find power plane pilots willing to teach the group. They'd sooner sell 'em "time on a ship."

In the year of '35 we purchased a secondhand Mead-Rhon Ranger and spent the remainder of the year teaching ourselves how to fly and figuring out the most practical solution for operation in our locality. The original Durand "24" on the old bus gave the wing very undesirable habits, and in general it needed a complete overhaul. So in '36 we proceeded to round off and greatly strengthen the wing structure. I should have said round off the leading edge because the change made it something of a deep Clark Y wing section and improved its performance a hundred per cent. The job cost us eighty-five dollars and a total of 1200 man hours. It was well worth it and made a mighty nice flying primary. We picked two Northrup primaries after this and will go to work on them sometime this year. Because the Mead has seen a year and a half of constant flying and hard service, it will be completely rebuilt as the Mead Challenger for secondary work, and the Northrups will remain primaries for training purposes.

Because we have access to the level runways of a comparatively quiet and level airport, we employ the auto tow. Routine procedure consists of reaching 600 feet of altitude with 800-foot tow lines and includes such things as 360° verticals, figure 8s, S turns, side-slipping, diving, and gentle zooms; also tailwind landings and precision landings. It may not compare to soaring, but it does pack a real thrill and affords us a very economical way of getting into the air. The pri- *(Turn to page 75)*

Flat level fields or airport runways lend themselves to auto-tow launching.

One of the Soo Glider Club's primary ships. Note the wagon wheels on skid.

16,000 persons took advantage of the British Civil Air Guard plan to learn how to fly, within two weeks of its announcement. Is this kind of plan applicable to light plane flying in America?

It has always been my contention that the "sporting crowd" in aviation will follow the footsteps of the sporting crowds of 1914-17 who were the first to volunteer, join sportsmen's battalions and even make what historians refer to as the great sacrifice. It was the sporting crowd that joined up regardless of regiment, rank or the front they were to be sent to. My sporting crowd includes the week-end sportsman and the polo player, the guy who plays sand-lot soft ball and the gentleman who owns a J Class yacht.

Some day, too, the sporting crowd in aviation will be the ramrod backbone of the air service. The present air service crowd will laugh at that, of course, but they also laughed at a handful of young muddy machine-gunners who in 1916 begged to be transferred from the trenches and assigned to the foot-bath cockpits of old pusher fighters. They said these men would never be anything but infantry machine-gunners, and that none of them had the background to become flying corps officers.

But we did. I was one of them. I can also add with a certain amount of pardonable pride that we did a pretty swell job. We learned to fly. We learned how to fight in the air, and many of us won our wings and cockpit seats in Camels, S. E. 5s, Bristol fighters, Handley Pages and Sopwith Salamanders. Most of us were just ordinary guys with a common-school education.

What all this is leading to is that some day I hope to see an Americanized version of the British Civil Air Guard organized in this country. I do not ask that it be the same. It would be impossible to run such a widespread organization in this country where the east and west coastlines are nearly 3,000 miles apart. It would be impossible to institute a civil air guard along British lines because we do not have the careful organization of flying clubs and the same system of pilot subsidy.

To explain further, the British Civil Air Guard is open to all males, and I believe a certain number of females, between the ages of twenty and forty-five. They must be British subjects and be able to pass a normal physical examination. Once past this stage they begin paying a small weekly sum, which amounts to something like eleven dollars a year, and take flight training on modern light planes at a nearby club under government jurisdiction. The course includes several military subjects such as bombs, machine guns, cameras, advanced and primary navigation and a certain amount of military groundwork. The general object of the course is to have a large number of persons available for air force duty in case a national defense emergency arises.

An American version of the civil air guard idea is not too hard to visualize. It could be done over here much more easily, when we consider the amount of money available and the amount that a certain wage-bracket crowd could afford to pay for flight training. There are plenty of fields available; there is plenty of instruction talent. Several of our light plane types could be turned out quickly to accommodate the number that would immediately make application. If the manufacturers, the light plane clubs, the present commercial schools and the insurance officials would all cooperate, I believe the idea could be a success in this country.

light plane flying clubs

conducted by arch whitehouse

Holt from Globe

The Beco-Brown looks experimental but it is a most practical airplane. It is a light plane; the motor a 90 h.p. Lambert. The combination of flaps and Handley Page wing slots insures an unusual measure of safety. Top speed is 120 m.p.h., cruising 100 m.p.h.

The objections to the scheme—and they have been loud and boisterous over there—take many strange twists.

In the first place, hundreds of present American light plane pilots who have already paid between $300 and $1,000 for their tickets will put up an unearthly yowl about letting others learn to fly under government protection for a nominal sum—let's say two dollars a week. In many cases these pilots entered light plane flying because it wasn't a run-of-the-mill sport, and they will resent the picture that comes to their minds of the skies being cluttered by hundreds of wild-eyed members of this hypothetical air guard. They will picture mad dogfights by squadrons of Cubs against armadas of Aeroncas, and life will not be worth living.

Captain Ashley McKinley with a Cub equipped with his inflated, balloon-fabric floats. Featured are five compartments, lightness. These floats can't rust and are naturally resilient in operation.

Another problem that could practically break up an American air guard within twenty-four hours concerns the light plane manufacturer. At first he will leap with joy at the prospect of selling more light planes to the clubs and organizations that come within this new national defense circle. Then a company other than his own will receive an order for ships, and what a howl will go up! There will be the usual charges of politics, lobbying and graft. Arguments will pockmark the business, and the members themselves will help this along. Those in one area will let out a loud bellow because they are being trained in Cubs when they thought they were to be given instruction in Taylorcrafts, and vice versa. They'll even fight about the color of the flying coveralls they will be required to wear.

Sounds crazy, eh? Well, all these things actually happened in Britain.

To get back to a more serious angle on the matter, there must be some consideration of insurance if air guard members are to be suitably protected. Airmen soldiers and sailors in the army and navy are covered by government funds in case of accident or death. What can the ordinary civilian be expected to do, beyond volunteering for flying instruction under a national defense plan? He can't be expected to take out insurance himself. That form of insurance comes pretty high, especially coverage on flight training under such conditions.

Let us assume that a form of civil air guard is started in this country with all the glorious ideas that were responsible for the British setup. Let us assume that the government agrees to accept the temporary enlistment of patriotic men and women who, on a payment of $100 a year, say, are given flight training to the extent that they can obtain amateur tickets.

Now let us suppose that you, a young man or woman between the ages of twenty and thirty, *(Turn to page 88)*

GLIDING AND SOARING

National Air Races glider stunt team. L. to R., tow pilot, C. Biggs; E. Lehecka, C. Decker, T. Bellak, and S. S. A. director, E. Southee.

AT THE NATIONAL AIR RACES

For the first time this year sailplanes and sailplane pilots were included in the schedule of events of the National Air Races at Cleveland, thanks to the efforts of Earl R. Southee, manager of the Elmira Area Soaring Association and director of the S. S. A. Pilots Emil Lehecka, Chester Decker and Ted Bellak were asked to put on a formation flight. Decker and Bellak used Minimoas, Ted's being loaned to him by Dick duPont, while Emil flew the Rhonsperber in which he recently won the title of National Soaring Champion. All three ships were towed up at the same time by a Bellanca Skyrocket belonging to the Puroil Co., and piloted by Charles Biggs. After releasing themselves, the boys looped, spiraled and performed other maneuvers in formation. The show was very well received by the spectators and officials.

Another star performer was Hanna Reitsch, who holds the rank of flight captain in Germany. Miss Reitsch flew a Habicht sailplane specially stressed to withstand dives of two hundred and fifty m. p. h. With this ship she put on a stunting exhibition that would do credit to a pursuit pilot, featuring outside loops, snap rolls, slow rolls, and inverted flying, not to mention some of the more commonplace aerobatics such as ordinary loops, wing-overs, dives, et cetera.

THE AMERICAN OPEN

This year an additional national meet known as the American Open Soaring Contest was held at Frankfort, Mich. Because of restrictions as to performance, many owners and pilots of utility-type ships were barred from participating in the Elmira meet, and the American Open was inaugurated to give them a chance at the prize money which previously has been distributed at Elmira. Qualifying performances at the new contest were so figured that utilities would have the advantage rather than sailplanes.

Conducted from August 27th to September 5th, the 1938 Open was featured by a total of three hundred and sixty-six hours of soaring flight and the breaking of a national record. Several new "C's," several five-hour legs on Silver "C's," consistently successful use of winch launching, thermal flights off dunes and distance flights down the dunes also marked the meet.

Perhaps the most dramatic flight was Dick Randolph's day-and-night endurance flight of twelve hours and eight minutes. Dick took off at two thirty-seven in the

The record holder! Helen Montgomery, new national women's endurance record holder, takes a smiling bow.

Lew Barringer in the "Mint Julep" comes in for a landing at the American Open Soaring Contest held at Frankfort, Mich.

afternoon from the beach at Point Betsie in a good north wind. He was fully prepared for a long flight, with plenty of warm clothing, a vacuum bottle of hot coffee, sandwiches, and even caffein tablets to keep him awake. He had stayed up nearly eleven hours at Sleeping Bear last year and knew what he was up against. At sundown all the other ships—there were sixteen in the air at one time this day—came down to let Dick have the sky to himself. Clouds blotted out the moon, and the only light came from the windows of scattered cottages and a few bonfires on the beach below. Hour after hour he stuck it out, until finally at two forty-five a. m., still in total darkness, he was forced to land by the wind shifting too far into the east. Dick's main complaint was that the caffein pills not only kept him on his toes all night, but also kept him from sleeping all the next day!

Just to show what a good sport Dick is, he let Hedderly, his crew, take the Cadet up three days later for a near-record flight of ten hours even.

A new national women's endurance record was set by Helen Montgomery. Helen is a member of the XYZ Soaring Club of Detroit, but was given the use of the gull-wing Franklin of the Wings Soaring Club of Philadelphia to make the flight. Helen took off the beach at Point Betsie at twelve three in a stiff north wind on Sunday, September 4th, all prepared to do her darnedest. She soon became familiar with the ship, which was totally new to her, and had no difficulty keeping well above the straight-wing Franklins, et cetera, and almost up to the Cinema, A. B. C. sailplane and the Grunau Baby, which kept fairly well together. The Albatross and Hawk were always on top of the pile—as many as fourteen ships being in the air at one time.

The good soaring breeze lasted until dark, but this day, as soon as the red ball of the setting sun dropped into the lake, pilots began to return, like birds to a rookery, to the take-off point on the beach. Among these was Helen, with a new national women's endurance record of seven hours and twenty-two minutes, exceeding the previous record set by Miss duPont by approximately two hours.

During the ten days of the contest, two hundred and seventy flights were logged for the sixty pilots and twenty-seven ships entered, giving a total of three hundred and sixty-six hours of soaring. Eight pilots won their "C" licenses, and seven qualified for the five-hour endurance leg on their Silver "C." Following is a list

—Conducted—by—Alexis—Dawydoff—

German champions at the Nat. Air Races, L. to R., Capt. Kamp, Gen. Fred Boetticher, military attache, Hanna Reitsch, Peter Riedel.

of all flights which were credited with at least five hours' duration:

Pilot	Home Port	Ship	Duration
Dick Randolph	Akron, O.	Cadet	12:08
Elmer Zook	Detroit, Mich	Hawk	10:41
Stan Corcoran	Hollywood, Cal.	Cinema	10:28
W. Moore	Denver, Col.	Grunau Baby	10:15
Hedderly	Akron, O.	Cadet	10:00
Art Schultz	Detroit, Mich.	A. B. C. Sailplane	9:46
Helen Montgomery	Detroit, Mich.	G. W. Franklin	7:22
Warren Merboth	Glen Rock, N. J.	Albatross	7:06
R. E. Franklin	Ann Arbor, Mich.	Franklin	6:41
Stan Corcoran	Hollywood, Cal.	Cinema	6:25
L. D. Montgomery	Detroit, Mich.	Hawk	6:14
Aleide Santilli	Detroit, Mich.	Franklin	5:37
Heyl	Ann Arbor, Mich.	Franklin	5:30
Ely	Angola, Ind.	Franklin	5:09
Helen Montgomery	Detroit, Mich.	Franklin	5:07
Dallas Wise	Detroit, Mich.	Franklin	5:01

Best altitude of the contest was made by Stan Corcoran, who attained twenty-two hundred feet in a thermal off the lake.

Best distance was obtained by Warren Merboth, who succeeded in making twenty-seven miles down the dunes in none-too-favorable weather. His nearest competitors were Zook, with twenty miles, Nowak with ten, and Corcoran with several flights of seven to nine miles.

Prizes consisted of fifteen hundred dollars points-award money distributed in accordance with Dr. Wolfgang Klemperer's Points Award System. This money was contributed by the father of Richard duPont to be used where it would do the most good. It was certainly well distributed at this contest, all pilots and ships—utilities as well as sailplanes—putting in *(Turn to page 77)*

A NATIONAL AIR YOUTH PROGRAM

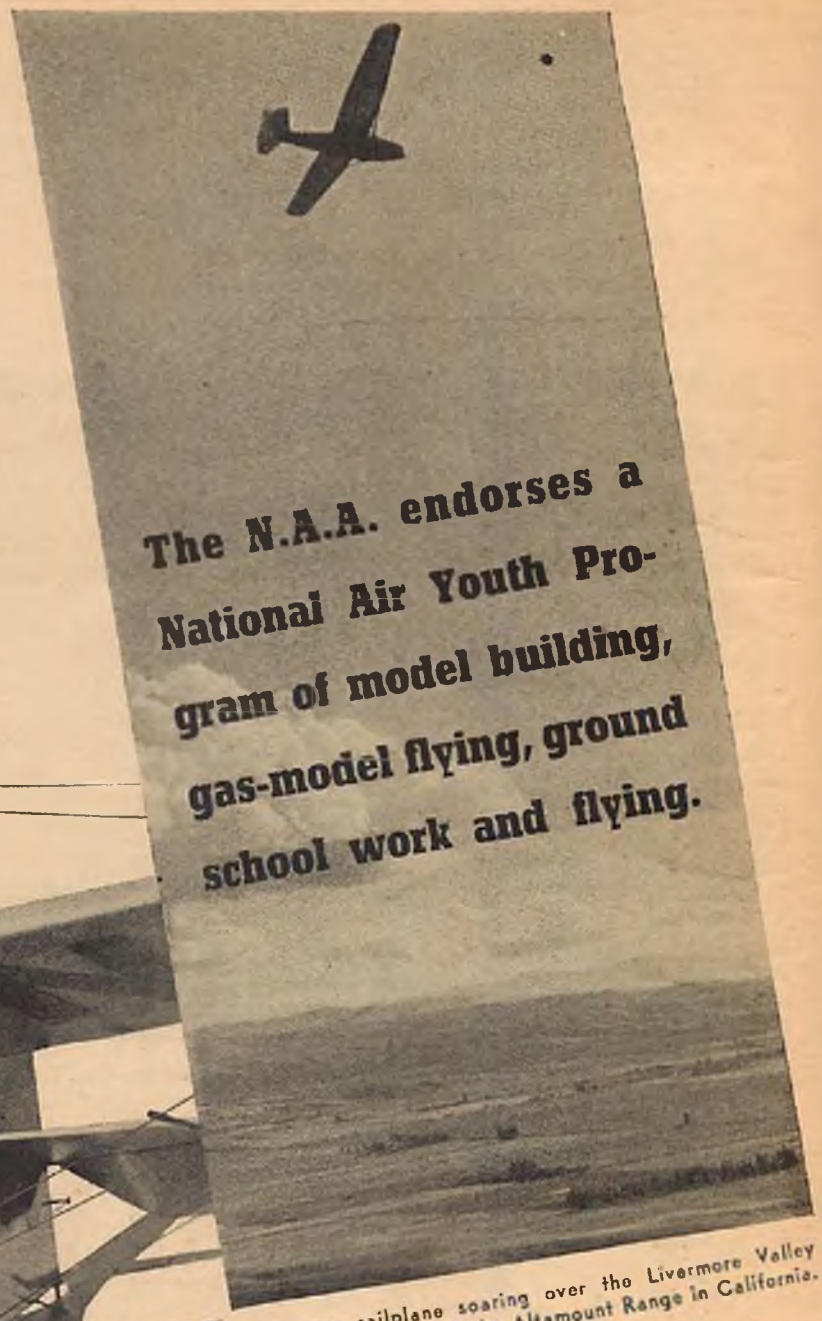
As the nation's oldest and largest non-profit organization for the advancement of aviation, N. A. A. encourages affiliation with it of organizations and individuals active in model building and in actual flying. Such affiliation is solicited in the interests of joint operation in the development of a patriotic, nation-wide program of aviation training.

Each year more than one million of the nation's youth graduate to manhood and citizenship. These "graduates" are the annual overflow from that vast group of twenty million young Americans between the ages of twelve and twenty-four, who from an aeronautical viewpoint collectively form the youth of the nation.

From this group, with greater national organization, can come new junior mechanics, factory workers and engineers for the industry; new flying cadets for our army and navy flying schools; new light-plane owners and potential sportsman-pilot buyers of aircraft; new air travelers on the nation's transport systems, and new users of air mail and air express; new voters to influence the legislators of the nation's air laws; new boosters for aviation in the homes of America.

A survey conducted by N. A. A. in Europe, where government-directed national air-youth programs are now under way, has pointed to the

Robert E. Bryant, South America, set a distance record of 1,014 miles for 122 cu. in. displacement light planes.



A Grunau sailplane soaring over the Livermore Valley soaring site located in the Altamount Range in California.

OFFICIAL SENIOR N.A.A. NEWS

Prepared by William R. Enyart, Sec. NAA.

need for better organization of aviation education in America on the part of all interested in this field. Joint action is called for if the United States is to match the results which are being obtained abroad.

From the surveys it has made, N. A. A. indorses a three-step National Air Youth Program, encompassing:

1. Rubber-model building and junior ground-school training.

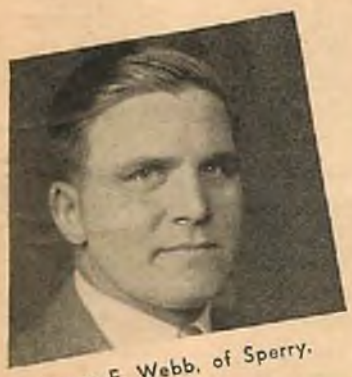
2. Gas-model building and advanced ground-school training.

3. Gliding, soaring, and light-plane flying.

Advancement is encouraged step by step by the use of distinctive pins and a series of merit or proficiency ratings for each step; by encouragement of local club activity; by local, regional, and national contests; and by coupling of school-time education with hobby-time training.

The following initial program details have been drafted in coöperation with the Academy of Model Aeronautics, the Soaring Society of America, the National Intercollegiate Flying Club, and the Private Flyers Association.

A national air-youth council comprised of representatives of these organizations and of each other organization which may become affiliated with N. A. A. in such activities, will direct these program details, make such changes from time to time as are desirable, and act to encourage coöperative action and greater government and industry support.



James E. Webb, of Sperry.

Oliver L. Parks of Parks Air College.

A portion of the huge Labor Day crowd at the National Air Races held in Cleveland.

Rubber-model building and junior ground-school training are fostered through affiliated organizations which meet proper educational standards and are active in advancing junior model building and air training. Affiliated groups and schools can, if they desire, secure at cost from N. A. A., official pins, merit badges, junior ground-school courses, club caps, jackets, and uniforms, and similar approved and standardized material. Available to such affiliated clubs are manuals for club and meet operation, and suggestions for local activity programs. Sanction is issued for meets sponsored by affiliated clubs without charge. Records established by members in this class may be registered as official upon payment of a small fee. Club leaders who meet the proper qualifications may receive appointment as official model-contest directors.

Gas-model building and advanced ground-school training are stimulated directly through individual membership in N. A. A. Such members are encouraged to organize local chapters of gas-model builders. Affiliated organizations are encouraged to foster such membership as an advanced accomplishment. N. A. A. members of this class are eligible for competition in all national and regional gas (and rubber model) contests sanctioned by N. A. A. and for many traditionally famous trophies. Other advantages of membership include an official model builder's license which, for gas-model builders, allows flying from approved sites; gas-model flyer's insurance at a special low rate; official recognition of regional and national records established by members without charge; and model experts and leaders, who hold this membership and have outstanding records of accomplishment, may receive special recognition by election to the N. A. A. Academy of Model Aeronautics, which is charged by N. A. A. with the drafting of official rules pertaining to model records and meets, with the encouragement of scientific development. There are also ten official merit ratings which may be won by members of this class.

Gas Model chapters receive each month contest and activity suggestions and news of other clubs. Clubs interested in conducting ground-school courses receive lecture material, suggested examinations, et cetera, at low cost.

Flight training is fostered by N. A. A. *(Turn to page 81)*

Thirty-five years ago the original Wright biplane was given to a British museum. To bring back this relic is a cause in which every Air Adventurer should join.

Greetings, Air Adventurers!

As you know, the most treasured relic of American aviation, the Wright biplane, holds an honored position in a British museum. Why it is there is an interesting story. All Air Adventurers should know this story, and this month we shall give it, as well as furnish our followers with a chance to aid in a great cause.

In the first place, we should explain that an important drive is being conducted by an organization incorporated under the title of Men With Wings, in which many of the best-known figures in American aviation have been enrolled. The purpose of this drive is to have the official records of the Smithsonian Institute changed so that the Wright Brothers are given credit long denied them, and also to help bring their historic plane back to this country. The ship, incidentally, is not being held in Great Britain under any particular bonds, and the officials of the South Kensington Museum will gladly return it to us if the proper steps are taken.

The reason the Wright biplane was sent to England by the Wright Brothers was because another plane, the Langley *Aerodrome*, was officially given credit for being the first heavier-than-air craft capable of flight while carrying a man. This decision was made by certain members of the old Aero Club of America and accepted as fact by officials of the Smithsonian Institute. The Langley plane was also given the place of honor in that museum. Later on a British mission, recognizing the true success of the Wrights, offered space for their biplane in the South Kensington Museum. The Wrights agreed, and there the ship has been for the past thirty-five years.

Langley's plane, a large monoplane affair, powered with what was the grand-daddy of all radial engines, was launched twice from a runway built on top of a boat-house anchored in the Potomac. Officials witnessing the second attempt on December 8, 1903, saw the ship take off from the runway under its own power and leave the rails. What happened after that remains the great query. Officials of the Aero Club of America declared the Langley plane flew for a short distance on its own power, in spite of a broken wing and tail assembly. Others deny that the machine was in flight, but state that it was obeying the force of inertia before it dove into the river.

On December 17th of the same year, or nine days later, the Wrights actually flew at Kitty Hawk, but what is now termed a "scientific misunderstanding" gave first-flight honors to Langley. The Wrights did not argue about it, but continued their experiments, whereas Langley gave up aviation entirely. So it is understandable, when the South Kensington Museum officials, recognizing the priority of the Wrights, offered museum space for their plane, that they should both accept.

Actual size of your Air Adventurers pin.

(MEMBERSHIP COUPON)

To the Flight Commander, Air Adventurers,
79-89 Seventh Avenue, New York, N. Y

I am interested in aviation and its future developments. To the best of my ability I pledge myself to support the principles and ideals of AIR ADVENTURERS and will do all in my power to further the advance of aviation.

Please enroll me as a member of AIR ADVENTURERS and send me my certificate and badge. I enclose ten cents to cover postage.

Name ..... Age.....

Address .....

.....

☐ Check here if interested in model building.

(This coupon may not be used after January 15, 1939.)

Tom Senior, instructor at Brant-Norfolk Aero Club, Ont.

A fighting airplane in a peaceful setting, the Curtiss A-12 Shrike. The Shrikes are being obsoleted by the Northrops and the twin-engined Curtiss attacks. This fine sample of photography comes from Frank Biagi, New York City.

The purpose of Men With Wings is to give Orville Wright and his late brother, Wilbur, official recognition in this country for their accomplishment, and to bring their hallowed plane back to its homeland.

Air Adventurers have long been trying to do something concrete for American aviation. Here is a chance for them to do something that will wipe out one of the greatest mistakes in the history of man-made flight. Petitions have been prepared by Men With Wings, whose headquarters are at 30 Rockefeller Plaza, New York City, and we suggest, if you are interested in this particular matter, that you write to Hampton W. Howard, executive secretary, and obtain one of these petitions. Read it carefully, and if you agree with its tenets, sign it. Then go to work among your friends and get them to add their names to the list.

Let's see how Air Adventurers can put this cause over!

See you all again next month.

Your Flight Commander,

ALBERT J. CARLSON.

CLUB NEWS

And now for the regular business of the month.

I would be missing a great trick if I failed to lead off with a note about Frank Biagi of New York City, who has sent us in one of the most interesting pictures of the year. We're reproducing it and hope you will all think a thank to Frank for the shot of the late Amelia Earhart. Frank is a new member who comes in loaded to the top longerons with enthusiasm for Air Trails, and he has also sent in his request for test papers, but failed to inclose his address, so we can't do anything about him until he sees this and drops us another line.

Nace Mifford, Jr., of Covington, Va., has sent in some good photographs of military planes and suggests that we start a department for amateur designers, in which they can present their ideas and sketches. Nace thinks that many a manufacturer would be interested in seeing what some of the amateurs are turning out. The idea is good, of course, but unfortunately we haven't the necessary space.

A rare map hound is Compton Hoover, of Frankfort, Ky., a keen member of Air Adventurers. He has sent us in some interesting clippings on the new Louisville Airport, which is undergoing vast improvements and being enlarged.

Earl Hafer of Nashville, a long-standing member, is now taking flight training on a Piper Cub and has reached the stage where he is recovering from spins. Thanks for the grand letter, Earl.

A new photographer in our list is R. Richard Meyers of Allentown, Pa., who sends us in an excellent enlargement of a picture of an A-17 attack ship belonging to the Third Group. We believe

(Turn to page 87)

We have seen many fine pictures of the late Amelia Earhart, but none that so completely reflected her charm and personality as this photo by Frank Biagi. You better save this picture.

WHAT'S YOUR QUESTION?

By Clyde Pangborn

Question: Will you kindly send me the names and addresses of the airplane companies on the West coast building all-metal or part-metal aircraft? A. J., Detroit, Mich.

Answer: There are a number of manufacturers building metal aircraft on the West coast and there isn't room enough to list them all. However, the most important are Douglas Aircraft Co., Santa Monica, Cal.; Northrop Aircraft, Inglewood, Cal.; Aviation Manufacturing Co., Downey, Cal.; Ryan Aeronautical Corp., San Diego, Cal.; Boeing Aircraft Co., Seattle, Wash.

Question: Would you tell me where I can buy plans drawn to scale of either Pensacola or Randolph Field or any other Army or Navy fields? Could you tell me if there is any difference between the Army and Navy insignia? S. R., Rochelle, N. J.

Answer: You cannot buy plans of any military field. The difference between the Army and Navy insignia is that the Army ships have a vertical blue stripe and horizontal red and white stripes on the rudder, while the Navy rudders are painted either red, blue or green, depending on the squadrons they belong to. The underside of the Army ship's wing has U. S. Army painted on it, while U. S. Navy appears on the side of the fuselage of the Navy ships.

Question: Who will I write to to get information on entering the Army or Navy Air Corps? J. C., Indiana, Pa.

Answer: Write to either the Adjutant General of the Army or U. S. Navy Bureau of Navigation, Washington, D. C.

Question: I am interested in building a light plane which I can power with a Ford model "A" motor or something similar—like the Henderson. Where could I purchase a set of blueprints of the Pietenpol ship shown on page 80 of the May issue? Do you know of any firm that sells blueprints of a low-wing monoplane? H. W., Culpeper, Va.

Answer: Write to the following firms: Payne Aircraft Corp., Joliet, Ill.; Heath Aviation Co., Benton Harbor, Mich.; and B. H. Pietenpol, Spring Valley, Minn. I don't know of any company which sells plans for a low-wing ship.

Question: Could you tell me if you know of any airports or airplane factories in the vicinity of New York City that give work to young men? I am eighteen years of age and have graduated from high school. D. T., Dobbs Ferry, N. Y.

Answer: Try some of the operating companies at Floyd Bennett Field, Brooklyn, N. Y. The only factory which hires young men without experience as apprentices is the Luscombe Aircraft Co., Trenton, N. J.

Question: I would like to become an airplane or engine mechanic in the U. S. Air Corps. I have one bad eye and would like to know if that would prevent me from entering the Air Corps as a mechanic. I am eighteen and a high school graduate. How much does it cost to enter and become a mechanic? G. A., Shelby, Ohio.

Answer: If you want to become a mechanic in the Air Corps write to the Commandant, Aircraft Technical School, Rantoul, Ill. Not knowing how bad your eye affliction is I could not tell you if it will prevent you from entering the school. There is no fee attached to enter the Aircraft Technical School. As a matter of fact, you get a private's pay while learning the trade.

Question: If I wanted to be a transport pilot at the Boston Municipal Airport, what kind of education would I need? R. T., Brockton, Mass.

Answer: No special education is required to become a transport pilot outside of having a minimum of 200 hours in the air and passing a written and flying test required by the Bureau of Aeronautics, Washington, D. C. If you write them they will send you their bulletin on pilot rating.

Question: I would like to know the exact speed and maneuverability of the much-talked-about Hawker Hurricane, and all its data. I would also like to know what the Hamilton hydromatic quick-feathering propeller does that is different from the standard. J. H., Garden City, N. Y.

Answer: As the Hawker Hurricane is on the British confidential list no information as to its performance or data is available. The maximum speed is supposed to be in excess of 400 m.p.h. The hydromatic full-feathering propeller blades are adjustable by means of an hydraulic system from 0-87 degrees pitch, while a standard adjustable propeller blade can be adjusted only to approximately 30 degrees.

Question: I would like some information regarding air hostesses—the rules and requirements, and names of books on the subject. Will you please tell me where the nearest air hostess school in my vicinity is located? E. B., Mt. Vernon, N. Y.

Answer: To become an air hostess the applicant has to be a registered nurse, between the ages of 21 and 26, not less than 5 feet, 2 inches and not more than 5 feet, 5 inches in height, and weigh between 100 and 118 pounds. The majority of hostesses are recruited from hospitals. Training schools for them are operated by the air lines, and I suggest that you write to any of these lines for further information. The addresses can be obtained from the N. Y. C. telephone directory. *(Turn to page 78)*

AS SOON AS POSSIBLE AFTER BEING RECEIVED, ALL QUESTIONS WILL BE ANSWERED. THOSE OF GENERAL INTEREST WILL APPEAR ON THIS PAGE; OTHERS WILL BE ANSWERED BY MAIL. ENCLOSE A STAMPED, SELF-ADDRESSED ENVELOPE TO INSURE ANSWERING.

INSIDE THE CHAMOIS POUCH

A COMPLETE BILL BARNES AIR NOVEL

By GEORGE L. EATON

EDITOR'S NOTE—Combining the unquestioned progress of the next few years, or even months, of aeronautical drafting and design with the skill of the author, these Bill Barnes novels are designed to entertain and to give you a prophetic glimpse into the future of aerial transport and adventure.

THE dapper little man with the waxed mustache and the tired, cynical eyes cursed softly and flexed his long fingers. Still opening and closing them, he crossed the mammoth living room and stood at a window looking down on Broadway.

A milk wagon clattered along Seventy-sixth Street and across Broadway. A uniformed patrolman yawned widely as he waved a hand at the driver. An emaciated figure that had rags for shoes shuffled along the pavement peering into refuse cans. A newspaper truck roared up Broadway with its early-morning editions.

The dapper little man, dressed only in an undershirt, trousers and red morocco slippers, shrugged his shoulders and returned to the table in the center of the room. His hands glided downward with the swooping grace of a gerfalcon to gather up two objects from the table, one in either hand. As his hands crossed he exchanged the objects from one hand to the other. His tired eyes brightened, for it seemed impossible to detect the transfer.

He did it again and again and again with the same result. His eyes were brilliant now and the deep lines in his face seemed to have vanished.

"Dolf! Eno!" he shouted. "Quick! I have it!"

In another moment slippered feet scuffed along the hallway. Two men with hard, intelligent faces appeared like shadows beside the one at the table.

Sleep disappeared from their eyes as they watched his deft hands move faster than the eye could see. Fascinated, they followed his graceful manipulations. They moved to different positions to see him work from all angles.

At last the little man dropped his hands to his sides in exhaustion. His face was flushed as he searched those of the other two men.

"You have it," one of them said. "It is per-fect. You had better get some rest now."

"Twenty-four hours," the little man whispered. "I said I could do it in twenty-four hours."

"In less than twenty-four hours you'll be using it," the other one said. "You had better get some rest."

The staccato chant of a guard reporting to the central guard room in the administration building floated faintly across Barnes Field, Long Island, at four o'clock in the morning. The low hum of motor traffic along Wauchuck Road to the north kept up its never-ceasing symphony.

All the runways on the field were dark, except the one leading directly into the wind that was automatically connected with the illuminated wind indicator. The shops, hangars, and mechanics' quarters were dark and silent. Lights gleamed only in the traffic control tower and in the four guard booths along the high, electrically charged wire fence surrounding the field.

At four o'clock the place was almost without life; at five seconds after four it became a bedlam of activity. The transverse bands of yellow and black pigment painted on the seven fifty-foot runways danced to life as the shadowless sodium vapor border lights were lighted along with the floodlights. A swarm of grease monkeys rolled the big stainless steel amphibian which Bill Barnes called the Charger, and three of his scarlet-and-yellow-and-black Snorters, out onto the wide, semicircular concrete apron, under the direction of Scotty MacCloskey, major domo and head technician on the field.

At fifteen minutes past four Bill Barnes, dressed in a white leather overall, white helmet and flying boots, threw his powerful body into a swivel chair in his private office and faced the four men who were waiting there for him. Those four were a hand-picked collection who had survived the thousand and one dangers into which he had led his intrepid little squadron. They were as closely knit as men must be when they have faced death above the seven seas together. Their very existence hinged on their loyalty to one another.

Bill's grim blue eyes softened as they flashed across the faces of I. Kinter (Shorty) Hassfurther, his right arm and chief of staff; Eric L. (the Red) Gleason, who had been flying combat ships with Shorty since they were attached to the same squadron of the Royal Flying Corps in 1916; Beverly Bates, the soft-spoken, brown-eyed Bostonian with the Harvard accent who came from the school of post-war flyers; and lastly young Sandy Sanders, the freckle-faced kid Bill had adopted and had trained from close to infancy.

As the twin Barnes-Diesels in the wings of the Charger and the engines in each of the three Snorters roared to life on the apron, Bill raised his voice to speak.

"I told you," he said, "I'd let you know where we are going this morning and why. I couldn't tell you before because I was pledged to secrecy."

"There is no reason why you should tell us now if—" Shorty began.

"I know," Bill interrupted, "you don't care where you're going or why. But I want you to know—just in case. The whole thing is a little screwy. Old man Mortimer of Mortimer & Company called me on the telephone a few days ago and asked me to come to his Fifth Avenue office. We've delivered valuable jewels for them before so I didn't think much about it when he told me he had an order to deliver a string of matched pearls to a certain place on the French Riviera. They are a wedding present for the daughter of a Greek multimillionaire. For some reason he stipulated to Mortimer that he wanted *me* to deliver them—fly them across. I supposed at first that he was some egoist after the publicity. When Mortimer told me the pearls were worth several hundred thousand dollars and that the Greek, Sarnoff, would pay a terrific fee to insure them during the flight, I was sure of it.

"But when Mortimer swore me to absolute secrecy the publicity angle didn't make sense. No one is to know where we are going or when. Mortimer will be here at five o'clock to deliver the pearls in person. I stipulated that I must see them myself before we took off.

"At first I intended to make the hop in the Charger, with Sandy in the tail. After I thought it over a bit I decided I wouldn't take the job at all. I called up Mortimer and told him and he raised the ante so high I couldn't afford to refuse it. But I don't like it. That's why I've asked the rest of you to fly your Snorters along with us."

"Don't you trust old man Mortimer?" Shorty asked.

"I trust him implicitly. But I don't know much about Sarnoff, except by reputation. We all know he is a Greek millionaire, but no one knows much about him."

"What about the customs?" Red Gleason asked.

"Mortimer says Sarnoff has fixed all that," Bill said. "He has a great deal of influence. All we have to do is deliver the pearls to him at his chateau near Cannes. Our regular papers will clear us for a landing there. So far as I know everything is perfectly all right. But I can't understand why Sarnoff wants to spend a small fortune for insurance and for our fee when he will get no publicity for himself or his daughter from it."

"Maybe he just has a heart of gold," young Sandy said, grinning.

"He's hardly the type," Bill growled. "O. K., that's all. I think I hear Mortimer's car at the Wauchuck Road gate. Scram, all of you except Sandy. I want him here as a witness when I receipt for the pearls. I don't want Mortimer to know that the rest of you are going with me."

While the others moved to the door, young Sandy edged toward Shorty with a suspiciously beatific look on his face.

As Shorty passed him he wrinkled his nose and sniffed.

"She's changed her perfume again," Sandy said.

Shorty's hard-bitten blue eyes twinkled with amusement for an instant, and then his expression became one of complete amazement as Sandy reached out a hand and seemed to extract a powder puff from the upper left hand pocket of Shorty's overall.

"Old Sir Lancelot of the airways," Sandy laughed. "He carries his lady's token over his heart!"

"Listen, you half-pint of poison," Shorty said as Red Gleason and Bev Bates began to grin, "keep your tricks in the nursery where you belong. I'll—"

"Hey!" Bill roared as Shorty made a lunge at Sandy. "What the hell is Mortimer going to think if he comes in here and finds us acting like a bunch of high-school freshmen? Get out of here!"

Bill's eyes were twinkling as the door closed behind his three pilots and he turned to Sandy. "I wish, kid, you'd get over those childish tricks of yours."

"For the love of Moses," Sandy complained, "what harm is a little sleight of hand going to do anyone? It takes a lot of skill to do tricks like that. I bought a book about it. Look! I'll show you how I can—"

"You'll show me nothing!" Bill roared. He lifted a telephone from its cradle as a bell pealed, and spoke into the mouthpiece. "O. K. Show them in," he said and turned back to Sandy.

"Wipe that simple expression off your pan," he said. "Old man Mortimer will be here in a minute."

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By GEORGE L. EATON

II—STRANGE DELIVERY

THE first man who followed one of Bill's guards into the office was large and elderly, with a florid face accentuated by a curling white mustache. He carried a pair of pearl-gray gloves and a walking stick in his hands. Immediately behind him came a dapper little man who also had a mustache, but waxed, and he was holding a brief case that was locked to his wrist by a thin steel chain. Following him was a thick-set individual with a bull neck and an expression that labeled him as a bodyguard.

"Mr. Barnes—Mr. Comet," Leopold Mortimer, the first man, said with grim dignity. "Jacques," he explained, "is one of my most trusted men. He usually accompanies me on expeditions such as this."

After Bill had introduced Sandy to them he said, "I don't quite get the idea of this thing, Mr. Mortimer."

Old Leopold Mortimer lifted his eyebrows as though to indicate that he did not deem any explanation necessary. "There is nothing odd about it, Mr. Barnes," he said. "We quite often have commissions when very wealthy and prominent people are involved. Quite often they wish absolute secrecy. Henri Sarnoff is an eccentric. But I am of the opinion, in this case, he doesn't want his purchase known because of the simple fact that he wishes to surprise his daughter. When people of her kind are married the whole world wants to know about every little detail, and her father doesn't crave that kind of publicity. The expense involved means nothing to him."

Bill gazed steadily at Leopold Mortimer for a moment and then shrugged his broad shoulders. "O. K. You brought my check?"

Reaching into an inside pocket, Mortimer extracted a wallet from which he took a check and extended it to Bill without a word. Bill read it carefully, sat down at his desk, indorsed it for deposit only and put it in the top right-hand drawer of his desk.

"Now the pearls," he said.

The bull-necked man with Mortimer produced a tiny key and unlocked the padlock that fastened the brief case to Jacques Comet's wrist.

Comet, in turn, unlocked the brief case. Bill saw that his hands were trembling slightly as he did it.

"We will let you inspect the pearls," Mortimer began, "and then we will seal them in a little chamois bag we brought along for the purpose. I assumed that you would want to carry them on your person."

"That's right," Bill agreed.

Old Leopold Mortimer's eyes were shining as he reverently lifted the little chamois bag from the brief case and carefully opened it. Then taking a square of black velvet from the brief case and placing it on the top of Bill's desk, he began spilling the contents of the chamois bag onto it.

The pearls slid into the little chamois bag, where they nestled bulgingly.

Bill and Sandy gasped as the matched pellets spread themselves in all their glory on the background of black. The microscopic ridges on each gem broke up the bright lights of the room like a prism, to produce the awe-inspiring illusion that each gem was a rainbow.

Old Mortimer broke the tension by saying, "That is the finest string of matched pearls I have ever assembled. You are satisfied?"

"Seal them up," Bill said brusquely. "I will deliver them to no one but Sarnoff."

"Quite correct. Those were his explicit directions." Mortimer reached for the pearls to replace them in the chamois bag, but Jacques Comet, his obsequious assistant, was too quick for him.

While Mortimer's hand was in midair Comet's right hand flashed downward to gather up the pearls. They slid into the little chamois bag, where they nestled bulgingly at the bottom.

For a moment the elderly man frowned at his overhelpful assistant, who was pulling the fastener closed and inserting a tiny padlock on the end; then he cleared his throat and said ponderously to Bill, "Now the receipt."

Bill read it over carefully, signed his name at the bottom with a flourish, and handed it back. "Do you wish to see us get away?" he asked. "Three of my Snorters are accompanying us for a part of the way—perhaps for all of it."

"*Three* of them!" Mortimer said. "An escort?"

"An escort. You have no objection?"

"Of course not," Mortimer said. "I merely marvel at the progress aviation has made. A whole group of planes spanning the Atlantic at a moment's notice!"

Bill smiled without answering as he tucked the little chamois bag down inside his overall.

Scotty MacCloskey was directing the operations of a couple of dozen grease monkeys as they went out on the apron. The twin opposed props of the three Snorters and the two single-blade, automatic-pitch props of the Charger were ticking over slowly. The goggled, white-helmeted heads of Shorty and Red and Bev Bates stuck above the rim of the three amphibians.

"See that the indorsed check in the right top drawer of my desk goes into the bank the first thing this morning," Bill said to Scotty MacCloskey after he had bade good-by to Mortimer and his assistant.

"Right, boy. I'll take care of it," old Scotty said. "Good luck. Keep your nose up."

Bill followed Sandy into the forward cockpit and dropped into the parachute chair. His eyes ran over his two main instrument panels and the .50-caliber Brownings mounted on each side of him, and their ammunition counters. He raised his hand.

The dispatch tower acknowledged and a signal flashed. Shorty's Snorter rolled slowly forward as he released his brakes. He blasted the ship around into the wind. The flaps came down and the Snorter stuck its nose up with the grace and speed of a wild fowl. As it began to spiral upward Red Gleason took his Snorter down the runway at terrific speed. He lifted the ship into the air to be followed a moment later by Bev Bates.

The twin Diesels pancaked into the wings of the Charger let out a mighty roar as the gleaming monster sped down the concrete runway. Crouching a little over the wheel, Bill took her into the air with the skill for which he was famous. A yellow and green light flashed on his instrument panel as the main landing wheels and the nose wheel slid up into the belly and the Charger became a low-winged, cantilever monoplane of tremendous speed and amazing maneuverability.

At ten thousand feet he leveled off and threw his radio key.

"Shorty, take the apex of a V," he said into the microphone. "Hold your speed at three-fifty. I'll be a little above you. We ought to pick up a tail wind soon. Signing off."

His tachometer registered a little over two thousand revolutions per minute as the airspeed indicator climbed to three hundred and fifty miles an hour.

As their tail lights disappeared into the dawn, the little man with the waxed mustache, Jacques Comet, stuck his left hand into the left side pocket of his jacket.

The startled exclamation that came from his lips caused Leopold Mortimer to gaze at him in mild surprise. The surprise turned to amazement as he saw Comet's face become a pasty white, and saw him go through the brief case as well as his other pockets with frantic speed.

"What's the matter with you, Comet?" Mortimer said sharply.

Comet looked at Mortimer for a moment as though he had never seen him before, and then some of the color drained back into his face. He stuck a hand inside his coat and drew out a leather wallet.

"There it is," he said weakly. He tried without success to manage a smile. "I put some . . . some important papers in my wallet and I thought I had lost them."

"You found them?" Mortimer said, losing interest.

"I . . . I found them," Comet said. But his voice didn't carry conviction.

III—FLOATING VULTURE NEST

THE tip of Cape Cod showed dimly below them just before the sun rose. Their engines were eased back to about sixty-five percent throttle as a thirty-mile tail wind caught up to them. They turned off their running lights, compared compasses, and Bill shot a sun sight to be sure that they were true.

Every half hour Bill talked to Tony Lamport, the chief radio operator on Barnes Field, giving him their position and the weather for him to check against the forecast. At the same time Tony took a radio bearing to cross-check the position Bill gave him.

"Wind eighteen miles, thirty degrees," he told his men as they flashed along the coast of Nova Scotia over Halifax. "Get up to fourteen thousand. Best altitude. We'll run into a front in a few minutes." He checked their fuel consumption as their load lightened and ordered their speed up twenty miles an hour to get maximum efficiency.

As Newfoundland loomed ahead fog rolled in to swallow them. When he could no longer make contact with Tony Lamport Bill began to check his position with Sandy, who was in the navigator's seat. A half-dozen times young Sandy started to speak to Bill over the interplane telephone to tell him something, but each time Bill interrupted him impatiently and gave him another check to make.

Beyond Newfoundland Bill altered their course almost due east, on a curved line that would take them seven hundred miles north of the Azores and into the Bay of Biscay.

"We'll strike the coast of France west of Bordeaux and cut southeast to Marseilles and along the coast to Cannes," he told his men. "Keep a close formation and leave your running lights on while we're in this fog."

"Listen, Bill," Sandy said into his microphone as Bill finished speaking. "I've got something I've got to tell you—"

It was at just that instant that the Charger burst through the fog into a great circle of sunshine with the blue sky above and a great spot of glassy-smooth water nine thousand feet below.

"Listen, yourself," Bill said. "Keep checking our position. You can get a sun sight now. We're flying a good deal south of our regular great circle course. We've got to keep check—"

He stopped as the light on his radio panel gleamed scarlet and threw the key. Red Gleason's usually calm voice sounded in his ear. Now it was excited and high-pitched.

"Do you see the plane carrier just on the horizon, directly off our starboard beam?" Red asked when he had been acknowledged. "I just put some

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glasses on her and she is catapulting a dozen single-place fighters into the air. The first element of three ships has formed a V fifteen thousand feet above her and the rest are joining them."

"Can you see her flag?" Bill asked quickly.

"She's not flying any flag," Shorty cut in. "She looks—"

"They've formed two stepped-up columns and they've laid their noses on us!" Bev Bates said quietly.

"Get upstairs!" Bill roared into his microphone. "They can't be going to attack. They're probably out here for maneuvers and want to look us over. Let me know the instant you make out their insignia."

Bill flipped his radio switch and said over the interplane telephone to Sandy: "Get back into the tail, kid, and break out your gun. Get ready."

Without a word Sandy pulled out his ear plugs and dove for the little runway that connected the two cockpits, while Bill glued a pair of binoculars to his eyes. Suddenly his whole body tensed. The leader of the sea-blue biplanes above him was rocking his ship to get the attention of the ships behind him.

The red call light on Bill's radio panel gleamed, but he did not see it. He was watching the "tail-wag" signals of the blues' leader. He saw him flip his ailerons and knew that he meant for the other ships to come into a close formation.

He snatched the binoculars away from his eyes and glanced down as he saw Shorty and Red Gleason reverse their direction and go into a long downward glide. He threw his radio switch and shouted into it. At the same time he heard a voice not unlike his own giving directions to his own men!

He listened for a fraction of a second, then drowned out the other voice with his own bellow.

"Disregard any orders you just heard!" he screamed. "They're in on our wave length. Bill speaking. They are going to attack. Get up beside me fast. Form an arrowhead column. I'll be at the peak. Shorty and Red on my left and right and Bev behind me. Hold it as long as you can. Don't take radio orders. I'll signal with tail-wags. If we have to break formation, remember to keep on their tails. I think they mount 20mm. cannons. They don't carry any insignia. They—"

"Here they come, Bill!" Sandy shouted.

"All the speed you have—and climb!" Bill roared.

The twelve sea-blue planes had spread out in two echelons, six right and six left, one a little above and behind the other. The sun was on their backs as they nosed down. But Bill saw their leader's arm extending upward above his cockpit and saw him rock his ship before he dove.

He rocked his own plane and dipped his right wing. The little squadron around him followed him as he power-dived the Charger and made a ninety-degree turn.

The concentrated roar of the twelve diving ships and the chatter of their machine guns were terrific. But their speed was too great for accurate fire. Their tracers wove white patterns of death through the sky as Bill and his men completed their turns and pulled out of their dives.

Beyond Newfoundland Bill altered their course almost due east, on a curved line—

IV—SANDY'S MESSAGE

AS the twelve lead-spitting ships passed below, Bill took his men into action with a decisiveness that was characteristic of him. He rocked the Charger and fishtailed his rudder. The little arrowhead column swung around and dove on the twelve blue ships with the speed and fury of four hawks diving on their prey.

Their powerful .50-caliber guns belched fire and death as the two echelons pivoted on their axes to the left. But their pivot was started too late. Bullets tore through their tail surfaces and crept forward to their cockpits. A white face flashed above the coaming of one of the blue ships as it yawed wildly and crashed into the one on its port side. The two mangled ships, locked in one another's arms, began a dizzy descent toward the waters of the Atlantic.

The blood was singing through Bill's body as he saw the four remaining ships in the right echelon close up their formation in answer to the flipping ailerons of their leader. His own arrowhead column was below the enemy now and turning with them to the left. He stuck the nose of the Charger up sharply in a swift climb to indicate that

his men were to get altitude. He looked back and saw that Shorty was grinning and holding his thumb up. That meant that everything was O. K. He stuck his own arm above his head with his thumb sticking up. Three thumbs jutted upward from the three Snorters.

Then Bill saw the leader of the blue ships rock, fishtail his rudder and rock his ship again. That meant the two echelons were going to attack separately. As they swung in different directions in a turn they stuck their noses down and converged their fire. Bill gave the signal his men had been waiting for. He dove sharply and then zoomed upward.

The four amphibians in the arrowhead column became four separate bolts of fire and death as they broke their formation and flashed out of the murderous fire of the ten attacking planes.

Bill's mouth became a firm, hard line across his face as he whipped the Charger upward and over on its back. What had been a plane, no faster than the rugged blue biplanes, became a streak of silver light.

The ten blue ships were concentrating on the Charger, at the same time trying to avoid the desperate fire of his men. They were forming a circle around him, trying to get him into the vortex of their fire. He whipped up again as Sandy's gun began to chatter. He chandelled up and came back at the blue ships with fury and abandon. They dove and zoomed and skidded to get out of his insane path. His fingers fastened hard on his gun trip as a sea-blue ship came under his sights. Its pilot popped upward until his safety strap dragged him back. His arms swung above his head as the ship slipped off to the right and the nose dropped.

Bill was talking to himself now, shouting orders at his men, words he was not conscious of saying. He poured soup into the pancaked Diesels in the wings of the Charger and implored it to give him more speed.

As he rolled right-side-up at the top of a loop another blue ship came under his sights. His line of tracers curled above the head of the pilot. He dropped his nose, ever so little, and his bullets tore into the fuselage of the blue ship and crept forward into the engine block. Little wisps of smoke rose along the engine housing as he began zooming upward.

"Hey!" Sandy shouted over the intercockpit phone. "Let me get a crack at them. I haven't had a clean shot yet."

"I don't dare let them get on my tail, kid!" Bill panted.

He knew that they were fighting with pilots skilled in the art of death—skilled and desperately eager to carry out their orders. As their ranks were cut they fought even more desperately, showing no sign of turning tail against the superiority of Bill's Charger and the darting Snorters.

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Bill saw Shorty Hassfurther come up and over in a normal loop on the tail of one of the blue ships. And while the blue ship waited for Shorty to roll his Snorter right-side-up, Shorty tripped his guns. Hanging head downward he raked the enemy ship with his deadly fire until the nose dropped and plunged toward the sea.

Then Bill saw something that brought his heart up into his mouth. He saw that ship after ship was being catapulted into the air off the big carrier far below them. A dozen more ships were spiraling upward to join the fight. His hand flew to his radio key as he hung the Charger on its props to take it upstairs.

"Bill speaking! Bill speaking! Bill speaking!" he shouted into his microphone. "Get upstairs! Form a V at thirty thousand. Break clear. Check in!"

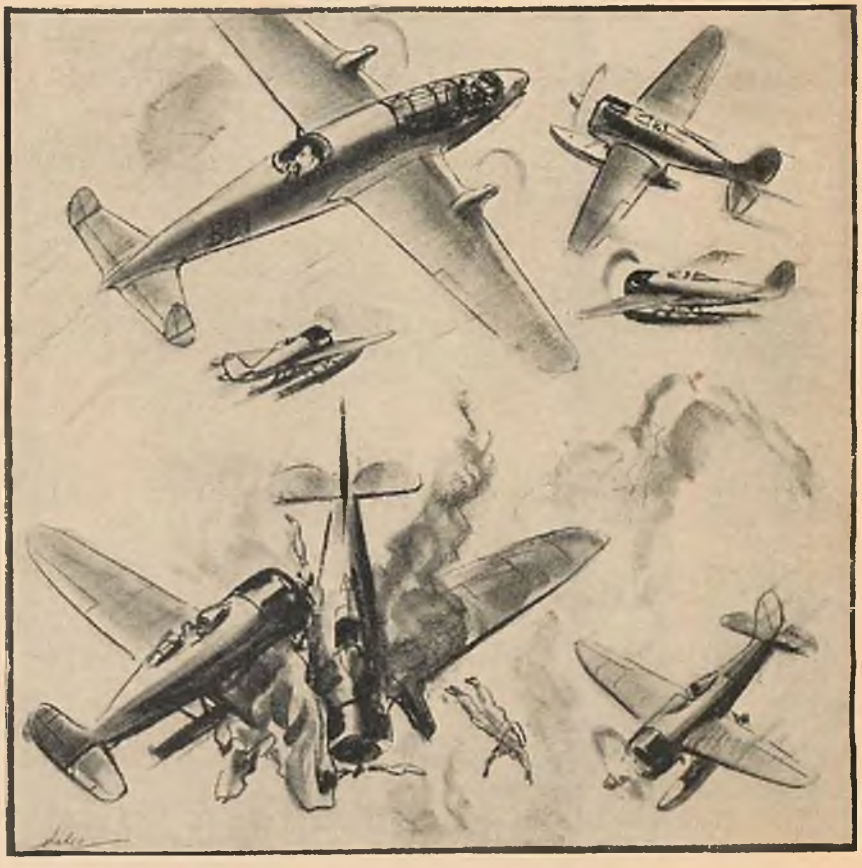
He waited with his heart in his mouth while Shorty and Red came back with an all-clear signal and came up beside him. The muscles in his cheeks stood out like whipcord as he saw that Bev Bates was locked in desperate combat with three ships far off to the left.

"Stand by!" he said to Red and Shorty as he opened the throttles of the Charger wide and went to Bev's aid.

He saw Bev whip over like a tumbler and rake their tails as they went by him. Then he was full around and his machine guns caught the last of the three ships under his sights. The burst of fire from his guns lasted only a fraction of a second. But it was enough. His bullets stole through the tail assembly of the blue ship and crept forward into its cockpit. The pilot fell over his stick and the ship held a true course, due west—with a dead man at the controls.

"Get up with Shorty and Red!" Bill shouted into his microphone.

"O. K., Bill. Bev speaking. O. K.



The mangled ships, locked in one another's arms, began their dizzy descent.

Go ahead." Bev's voice was as calm and collected as it would have been had he been saying good morning.

"Calling all planes, calling all planes," Bill said quickly. "I'll take the point of a V at thirty thousand. Don't forget your oxygen. Get up there fast. They can't follow us. Close formation."

They hung their ships on their props as a full score of the sea-blue fighters came tearing up below them. At twenty thousand feet they closed their overhead hatches and opened their oxygen jets. When they were at thirty thousand feet the blue ships below began to wallow, and it was only too evident that they had reached their ceiling.

As Bill figured out his position and gave his men their course, the little formation stuck its nose into a great cloud mass that completely engulfed them. Rain, that was half hail, began to beat down on them mercilessly. From the dials on their instrument panel came a ghostly phosphorescent glow. For thirty minutes they fought their controls until they were on the other side of the front. Then Bill gave vent to the turmoil that was in his mind.

"What the hell," he asked his men over the radiophone, "is it all about?"

As Shorty Hassfurther started to speak young Sandy's voice cut in. And Bill knew, instantly, from the high-pitched tension that was in it, that here was the solution to the things which had happened.

"I . . . I," Sandy said, "have been trying to tell you ever since we started. Listen, you haven't got those pearls Mortimer gave you in the pouch you're carrying—"

"I don't have what?" Bill roared.

"You don't have the real pearls," Sandy said in a trembling voice.

"Who in hell does have them?" Bill shouted.

"Wait until I tell you, Bill. That assistant of Mortimer's switched them. I saw him do it. He substituted another string for the real ones. He palmed the real ones and slipped another string in the pouch. I didn't dare say anything when he did it. I was too surprised. It's a sleight-of-hand trick I learned from that book I was telling you about. It's an easy trick if you know how."

"Listen," Bill shouted, "what happened to the string Mortimer put on my desk?"

"Comet, the assistant, put them in his pocket. I saw him when he did it."

"Where are they?" Bill almost screamed.

"They're in my pocket!" Sandy said. "Just before we left your office I slipped my hand in his side coat pocket and took them out. I have them in my overall."

"Then what do I have in this pouch?" Bill asked.

"Gosh, Bill, I don't know."

"I saw a string in the pouch just before Mortimer sealed it," Bill said.

"I got that string in my pocket," Sandy answered stubbornly. "I'm positive, Bill."

Only the roar of their throbbing motors as they bored on and on through the thin, still air broke the silence for a few moments. Then Shorty Hassfurther said in Bill's ear:

"You may be carrying a keg of dynamite in that pouch. What are you going to do?"

"I'm going to deliver the pearls Sandy is carrying to Sarnoff," Bill said. "That was the contract I made with Mortimer. I indorsed his check to close the deal. That's what he paid me for."

"What about the string in the pouch?" Shorty asked.

"We'll wait and see what Sarnoff does," Bill answered. "He may give us a lead that will tell us what to do." He slipped his hand inside his overall and touched the chamois pouch. "If it's dynamite," he finished, "I'll try to get rid of it before it goes off."

V—HENRI SARNOFF

THE gold of the setting sun and the unbelievable blue of the Mediterranean Sea were merging into a fantasy of color as they nosed down out of the Maritime Alps and circled above the little perfumery that is the town of Grasse.

Long shadows played across the field as their wheels touched the airport between Grasse and Cannes. Fifteen minutes later Bill and Shorty and young Sandy were in the back of the chauffeured car Henri Sarnoff had sent to the airport to await their arrival. Red Gleason and Bev Bates were left at the field as hostages to present their credentials to the authorities and guard the Charger and the three Snorters.

Lights were twinkling like giant fireflies as they swung out of the town of Cannes, along the Corniche Road toward Nice. While they were passing through the resort town of Antibes, Bill took the chamois pouch from his pocket to examine it. He put it back in his pocket without trying to open the little padlock.

"Let me have those pearls, kid," he said to Sandy.

Sandy's hand darted into his pocket, and a moment later he deposited the scintillating string of gems in the large foulard handkerchief Bill had spread on his knees. A sigh of intense relief escaped Sandy's lips as he drew his hand away quickly.

"Gosh," he said, "I'm glad to be rid of *them!*"

Bill drew the four corners of the handkerchief together and tied them in a knot.

"You each brought an automatic?" he asked.

They nodded without speaking.

Some minutes later the chauffeur swung into the great courtyard of the chateau Henri Sarnoff had modernized with a small fraction of his millions. Lights blazed in every nook and cranny of the big mansion nestling on the hillside.

As a houseman opened the door of the car Bill stepped out and walked slowly across to the low retaining wall that overlooked the winding Corniche Road. He was nervous and on edge as he had never been before. What, he asked himself, was behind this thing? Was it just an attempt on the part of Mortimer's clerk, Comet, to steal the real string by substituting a worthless one? The thought of the dozen sea-blue fighters that had been catapulted into the air in mid-Atlantic to stop him drove such a possibility from his mind. He knew that airplane carrier had been stationed there to stop him. The admiralty of some nation had known the route he would take, or had gambled on it, and had placed the ship there to prevent him from reaching Europe.

But why? What was inside the little pouch Mortimer had given him? He turned away from the twinkling lights far below and joined Sandy and Shorty.

"Keep your eyes open," he said as they followed two housemen, who had their bags, toward the five-sided tower which projected from the face of the chateau and was the entrance.

They followed the housemen up two flights of the winding staircase inside the tower. From a landing on the third floor they crossed a little bridge that took them into a high-ceilinged room that was exquisitely decorated with panelings and woodcarvings.

Behind a desk that stood beside a mammoth fireplace at the far end of the fifty-foot room sat the lone occupant. As the housemen entered he lifted his gaze to nod at them. They placed the three bags on the floor and departed, closing the door firmly after them.

The man behind the desk got to his feet as Bill and his men advanced down the long room toward him. He placed his fingertips on the desk and watched them through calm, impersonal eyes, not deigning to speak until they were directly under the square of bright light that shone down on them just before they reached his desk.

"Please do not come any farther," he said in a voice that was surprisingly mild and mellow.

His entirely bald head and dark eyes gleamed as he searched each of their faces with his darting glance.

"You are Mr. Barnes?" he said to Bill.

"I am," Bill said impatiently. "I wish to see Mr. Sarnoff."

"I am Mr. Sarnoff," the other said quietly. He stepped around from behind the desk, and a smile that was almost obsequious took the place of the autocratic expression.

As Bill shook hands with him he saw that the figure that had seemed so formidable in the dim light was a far-sighted little man with a manner almost timid. Bill marveled that such a man could have built up such a mighty, world-wide reputation. He knew that Sarnoff was reputed to be the head of half a dozen different syndicates which dealt in and had almost a complete monopoly on as many different metals.

The millionaire became all politeness as he bowed from the waist to Shorty and Sandy and extended his hand. "This is more of an honor than I expected," he said. "Mortimer did not tell me you were bringing your men with you. It is embarrassing, too," he hurried on, "because, as you know, my daughter is to be married in two days, and the chateau is filled to overflowing with guests."

"We can no doubt find a place to stay in Nice," Bill said. "After we—"

"No. No. You will be my guest, Mr. Barnes. I have so arranged it. But I will send your men to Nice and will arrange everything. Then we can transact our business. The airport at Cannes telephoned me a short time ago about your arrival and asked me to certify your various credentials."

He had moved back to his desk to press two buttons while speaking. As he finished the door opened and a tall, pale-faced man and the same two housemen came into the room. Sarnoff spoke swiftly to the pale-faced man in French. Almost before Bill realized what had taken place, his men were gone and he was alone in the room with Henri Sarnoff.

INSIDE THE CHAMOIS POUCH

A COMPLETE BILL BARNES AIR NOVEL

By GEORGE L. EATON

VI—DANGER WHISPERS

"YOU will sit here, please," Sarnoff said, indicating a chair beside his desk. "I am most anxious to see the pearls Mortimer has sent me."

Bill's hand slid into the side pocket of his jacket. His fingers fastened around the foulard handkerchief. For an instant he hesitated and started to ask a question. Instead he fastened his eyes on Sarnoff's eager face and drew the precious little bundle forth. Sarnoff's expression did not change in any manner as Bill laid it on the desk and began untying the knots.

"A-a-h-h!" Sarnoff ejaculated. "They are stupendous!"

He picked the pearls up, still in the handkerchief, and moved out under the brighter light to examine them more closely. After a few moments he went back to his desk to screw a monocle into his right eye. Again he moved back to the bright light.

His face was a picture of polite happiness as he dropped the monocle into his hand and put the handkerchief back on the desk beside Bill.

"Never," he said, "have I seen such a superbly matched string. Mortimer has outdone himself. My daughter must see them at once. I had intended keeping them as a . . . what do you say? . . . surprisement. But they are too beautiful to keep to myself. Truly, I must share my delight."

Again Sarnoff pushed a button on his desk. The same pale-faced secretary came into the room to receive instructions in French.

While they talked, Bill Barnes relaxed for the first time since those dozen sea-blue fighters had opened fire on him over the Atlantic.

There was no doubt about the thing in his mind now. Mortimer's assistant had tried to steal the pearls and substitute another string. Sarnoff was undoubtedly delighted with them. Bill made a mental note to cable Mortimer the first thing in the morning, giving him all the facts.

Sarnoff was clucking to himself, still examining his precious gems under the bright overhead lights.

Then the door opened and two men in evening clothes and a woman came into the room. Bill rose to stand beside the desk as they advanced down the long room toward him.

He was amazed by the statuesque beauty of Sarnoff's daughter. Apparently about twenty-seven years of age, she had the bearing and the head of a Greek goddess. She was dressed in a frock of sheer chiffon that clung to and accentuated the grace of her body. Her gaze met Bill's for an instant, and he was startled by the shrewd, almost Machiavellian expression in her hazel eyes. She approached her father in a calm, unhurried manner that suggested

Sarnoff made a lunge toward Bill's throat with outstretched hands.

that nothing in the world could upset her.

She inclined her head and bowed with an abrupt aloofness as Sarnoff presented her to Bill.

Then Bill forgot her for an instant as Sarnoff introduced him to a short, swarthy man who was her fiancé, Georgio Cianelli. Cianelli's eyes bored into Bill's with that same searching glance that was in the eyes of Drusille Sarnoff. Searching, shrewd, contemptuous.

"Father," the girl said, indicating the second man with her, "this is Mr. Eden Aird. He was with us when Casimir summoned us here. We asked him to accompany us. My father, Mr. Aird."

Something of the bearing Bill had first seen came back to Sarnoff as he bowed to Aird. He saw, also, that Cianelli was regarding Aird with angry, belligerent eyes.

But their lack of enthusiasm did not seem to bother Aird. He shook hands with Bill with that easy grace that is characteristic of a certain type of Englishman. "I am pleased and proud to know you, Mr. Barnes," he said.

Bill liked the man instantly. Partly, perhaps, because he was the only other Anglo-Saxon in the room, and partly because he seemed to be the only one of all of them who was entirely at ease.

"Now," Drusille Sarnoff said in pretty English, "why are we summoned here? Only to meet the renowned Mr. Barnes, or for another reason, too?"

"There are two reasons," Henri Sarnoff answered gently. "Mr. Barnes has just arrived from America and will be our guest. Another reason is the thing he has brought us."

Bill could feel the tenseness that suddenly permeated the room. Even Aird, the seemingly debonair Englishman, was different now. His face seemed to have become older and thinner. He looked almost as though he stood poised on the balls of his feet, ready to go into action. The swarthy Cianelli studied Sarnoff from beneath his heavy brows. For an instant he flicked a glance at Bill Barnes that reminded Bill of the darting tongue of a startled snake. Drusille Sarnoff had a new gleam of interest in those strange eyes of hers.

Bill shifted his gaze to Sarnoff's face, and what he saw there startled him again. The man had changed like a chameleon. Bill watched him in amazement as he dropped the corners of the handkerchief in his hands that they might all see the string of pearls nestling there.

They crowded close to Sarnoff to peer with fascinated eyes at the lustrous gems. None of them spoke until Drusille Sarnoff broke the silence.

"They," she said, "are what Mr. Barnes brought you from America?"

"I had them brought as a wedding gift for you," Sarnoff said. "I had intended to keep them as a last-minute surprisement."

"They are not what I expected," she answered evenly. "They are magnificent."

"May I take them in my hand?" Aird asked quietly. "I have no words to express my feelings about them. I would like to touch them."

"No one may touch them until after the bride has worn them," Sarnoff said. "I have not touched them myself. It is perhaps a silly superstition. But I do not wish to violate it."

And now, as Georgio Cianelli's eyes fastened themselves on Bill's face again he became aware of a subtle sense of danger in the room. He saw Cianelli and Drusille Sarnoff exchange curious glances.

Drusille Sarnoff was already on the way to the door when her father said, "I think you had better leave us now, my dear, and go back to your guests. I wish Georgio to remain here with me while I give Mr. Barnes a receipt for the pearls. Mr. Aird will be good enough to accompany you, perhaps."

It was while Sarnoff was speaking that Bill heard that distinct murmur in his ears as Aird swung behind him to join Mademoiselle Sarnoff. "Be careful, Barnes," Aird whispered. "Be careful!"

That was all.

Bill's eyes followed him as he joined Drusille Sarnoff and watched them go out the doorway together. Cianelli followed them as far as the door and closed it carefully behind them.

"You will sit here please, Mr. Barnes," Sarnoff said, indicating the same chair in which Bill had been sitting before. Cianelli came down the length of the room to stand partially behind Bill and across the desk from Sarnoff.

As Bill sat down and raised his eyes he saw Sarnoff reach a hand into a lower waistcoat pocket. When he brought it out he held a tiny key between his thumb and his forefinger. He held it up to Bill's gaze, and his own eyes were as impersonal and hard as two pieces of ice.

"Do you know what that will open, Mr. Barnes?" he asked.

"It might open any number of things," Bill said as evenly as he could.

"One thing in particular," Sarnoff said coldly, "is the little chamois pouch Mortimer gave you. It was made to open that. Where is it?"

VII—LONG-LAID SCHEME

SOFT strains of string music floated through the window behind Sarnoff to mingle with the low murmur of the voices in the courtyard. The roar of a motor come to life drowned them both out for a moment, then was gone.

Bill Barnes was aware only of the beating of his own heart and the terrific silence in the room. He gazed at the little key gleaming brightly in Sarnoff's hand as though it had hypnotized him.

"This," he thought, "is what I have been secretly dreading. I felt that it was coming, though I tried to believe everything was all right. Now I have my chin out and I've got to cover up before I'm hit."

And suddenly it came to him that Sarnoff had known all the time that the pearls had been switched by Comet, Mortimer's assistant. And that Sarnoff knew that he, Bill, knew it. It came to him, too, that Sarnoff's daughter and her fiancé, and even the Englishman, Aird, had known that the pearls lying on the desk were not the ones he was supposed to deliver to Sarnoff. He could feel cold perspiration oozing out on his forehead as he realized he had been a fool to let Shorty and Sandy be sent away.

An hour seemed to pass while he stared at the little key and tried to think. What, he asked himself again, is in the pouch that is burning into my chest inside my pocket? Will they let me out of here alive if I give it to them? Why should I dicker with my life as the stake over something that is of no value to me?

He reached into a pocket and drew out a handkerchief and very deliberately wiped his forehead. When he had finished he had made his decision.

"Where is what?" he asked, and his own voice sounded unnatural to him.

He heard Cianelli suck in his breath behind him and saw a trace of a smile flicker on Sarnoff's lips.

"You are being a fool, Barnes . . . what you Americans call a sucker," Sarnoff said. "That little pouch means nothing to you. It means everything to me. You'll die if I don't get it. You may die if I do get it. Where is it?"

Bill managed to laugh lightly. "I'll make a bargain with you, Sarnoff," he said. "I will tell you how you can get the pouch if you will tell me why you want it, and what is in it."

"He is wasting time!" Cianelli hissed.

Bill turned his head to look at him, and in doing so he found himself staring into the mouth of an automatic pistol. "Don't get nervous," he told Cianelli with a forced grin.

Cianelli's answer came in explosive Italian that Sarnoff stopped with an upraised hand.

"Let me explain to you, Barnes," Sarnoff said. "There is no reason for me to explain except that I admire your . . . your guts. Don't try to interrupt me or I shall tell Georgio to use his pistol. We are losing valuable minutes. Now, Mortimer's assistant, Comet, is a man who knows the value of jewels and has

the hands and dexterity to take them from whoever happens to be wearing them. We planted him with Mortimer a year and a half ago just for the purpose of switching that string of pearls when Mortimer gave them to you to deliver to me. How you discovered he did it we don't know. But we received word from him that the real pearls had been taken from his pocket before you left Long Island. Comet, you may be sure, will pay for doing his work so poorly.

"The task of selecting a string of pearls for my daughter was given to Mortimer because of his integrity and reputation. The task of bringing them to me was given to you for the same reason. We wanted no one to know, especially you and Mortimer, just what you were doing. We knew you would both be above suspicion of any kind.

"Comet upset a very carefully laid plan by his bungling work. Even the marriage of my daughter was arranged to coincide with the finish of our work in America and the delivery of the pouch to me. The real pearls are of no importance or value compared to the value of the contents of that pouch. These pearls," Sarnoff said, indicating the matchless string on his desk, "might have reached me sometime and I could present them to my daughter. It is quite up to your reputation, quite amazing, in fact, that you have delivered them instead of the pouch—"

"I was paid to deliver them," Bill said.

"I told you not to interrupt," Sarnoff said. "Now you know the facts. Where is the pouch?"

"What is in—" Bill began.

"Don't shoot!" Sarnoff said to Cianelli. "A shot will be heard in the courtyard. We can handle it without that."

As Sarnoff finished speaking he made a lunge toward Bill's throat with outstretched hands, and desperately Bill tried to reach the automatic in his inside coat pocket.

But the blow from the flat side of Cianelli's weapon stopped his attempt, for it dazed him. He felt Sarnoff's hands around his throat and sought with all the strength in his powerful body to throw him off. But he could feel himself losing consciousness as another blow landed on the side of his head.

He slipped off the chair and slid to the floor with Sarnoff on top of him. The moment of Bill's greatest misadventure had arrived.

VIII—TO TURGUT

BILL BARNES struggled with all his will power to keep his senses from slipping away from him again. He tried to open his eyes, but could see nothing except a whirling circle of light. He clenched his teeth and tried to concentrate his gaze on some one object. He tried to bring his hands up to his throbbing head, but found that they were securely bound and that he could not move his feet. He put all the leverage he could command into a futile effort to free his wrists. The bonds seemed only to cut deeper into his flesh.

Bright lights began to explode in his brain again and he fought desperately to retain consciousness. Then the sound of low murmuring voices came to him, and he knew that he was not alone. He strained to hear some word or the inflection of a voice that would tell him where he was. Opening his eyes again he found the room beginning to take shape. The high ceiling, the wood carvings, the paneled walls, all seemed familiar. Then he remembered, knew he was still in the reception room of Sarnoff.

He rolled quietly over on his side so that he could see the two dim figures through the bright patch of light just ahead. They were Sarnoff and Cianelli, and he strained to hear what they were saying. Through half-closed eyes he saw Sarnoff come under the bright patch of light with a string of pearls in his hand, and he knew that it was the string that had been in the little chamois pouch in his pocket.

Bill's eyes flew wide as he saw Sarnoff detach one of the end pearls and half turn it with his fingers so that it came in two. He heard the ejaculation that left the lips of both of them as Sarnoff probed with a small forceps into the inside of the pearl and brought out a roll of something white. Then Sarnoff unfastened one end of the roll and held it up to the light to inspect it eagerly. The man nodded his head in satisfaction as he stuck his monocle in his eye to study the tiny roll of paper more carefully.

"It is complete?" Cianelli asked eagerly.

"It is what we expected," Sarnoff said. "We haven't time to inspect all of them. That swine on the floor has delayed us three hours. We must have it in Turgut at least five hours before the Imperator makes his address to the assembly. He must study it, to be sure before he speaks. Your plane is ready?"

"My plane is ready," Cianelli said. "But my pilot has disappeared. I impressed on him that it was of the utmost importance that he be ready at any moment. I believe the fellow was half drunk tonight. His behavior has been exemplary during the several months he has been with me, until tonight he almost forced himself on Drusille and me during the evening. I can fly the ship, but—"

"You mean the Englishman, Aird, Drusille introduced to me?" Sarnoff snarled.

"Yes," Cianelli said, and his swarthy face was almost white as he saw the intense anger written on Sarnoff's face. "He is a clever pilot, a—"

"You fool!" Sarnoff shouted. "He is a spy. I meant to speak to you about him after this thing was over. He knew what Barnes was supposed to bring us. It was not by chance he got in here with you and Drusille. He wanted to touch those pearls with his hands to see if they would come apart. He has been communicating your every movement to his government ever since he has been with you. No wonder they know as much as they do. It is a miracle that our plan has worked with such fools as you and Comet a part of it!"

"But—" Cianelli began.

"And Drusille has chosen you to be my son-in-law!" Sarnoff screamed. He extended his hands above his head in supplication and started to pace down the room. He stopped as his eyes fell on Bill's prostrate body.

Bill's eyes were closed again now to give the impression that he had not yet regained consciousness.

"Here!" Sarnoff snapped at Cianelli. "Get these ropes off Barnes and bring him around. We'll force him to fly us to Turgut. We don't have time to do anything else. We are to be picked up by an escort of eight planes immediately after we leave here. We have only a few minutes. Hurry!"

Bill could feel the mute Cianelli fumbling at the bonds at his feet and heard Sarnoff say, "Here, take this dagger."

The pressure on his ankles and wrists disappeared as Cianelli cut the bonds, and he pretended to breathe deeply of the ammonia solution that Sarnoff stuck under his nose. He let his eyelids flutter open and closed.

"Help me get him up on that chair," Sarnoff said.

Bill permitted his two hundred pounds to hang like a dead weight as they lifted him into a large chair and stuck the solution under his nose again. This time when he opened his eyes he left them open. He stared at Sarnoff and Cianelli as though he had never seen them before.

"Do you know where you are, what is happening?" Sarnoff snarled at him.

Bill studied his face for a moment and let his glance wander to Cianelli and back to Sarnoff.

"Yes," he said. "You—"

"Yes, yes!" Sarnoff said. "We knocked you unconscious and took your little pouch. That's over. You are fortunate we didn't kill you. You owe us your life. Do you understand that, Barnes?"

"Yes," Bill said. "If I look at it that way, I suppose I do."

INSIDE THE CHAMOIS POUCH

A COMPLETE BILL BARNES AIR NOVEL

By GEORGE L. EATON

"Here," Sarnoff said as he poured a drink of brown liquid from a decanter into a glass. "Drink this, then get up and walk the length of the room and back. I am going to give you an opportunity to pay us for not taking your life."

"Just give me a glass of water," Bill said. He drained the glass Sarnoff handed him and got to his feet. One of his knees buckled for an instant. He caught himself and slowly walked the length of the room and back again.

"What do you want?" he asked Sarnoff. "I'm not fool enough to think I can beat you. You have won. I want to be out of this thing and get back home. I will do what you want me to if you will promise that you will give me and my men safe conduct out of the country after I have finished."

Sarnoff's beady eyes bored into Bill's for a matter of ten seconds. What he saw there must have satisfied him. A trace of a smile flitted across his face and was gone. "It is no wonder you have gone so far, Barnes," he said. "You are a wise man. I will promise you and your men a safe conduct out of the country after you have finished. It is necessary that we be in Turgut within three hours. It is six hundred miles away. Cianelli's amphibian is moored in the bay. We want you to pilot us to Turgut. The ship is ready, fully fueled. You will have no trouble with it."

"I will get immediate permission to fly back here?" Bill asked. He knew in his heart that Sarnoff would lie to him, but he was willing to take the risk. He knew that after they reached Turgut he would disappear, as hundreds and thousands of others had disappeared there. He had an inkling now of what was on the little rolls of paper within that fake string of pearls, and he was willing to risk his life to prevent any disaster he might have caused by bringing it across the Atlantic. He knew he must gamble, but that the chance he would take would be small compared to the thing that would occur if that fake string was delivered to its destination.

"We will guarantee your safe return back here," Sarnoff said. "Your men will have nothing to fear while you are gone."

Bill stuck his hands out at arm's length in front of him and flexed his fingers to see if they were steady. There was not even a tremor.

"Right," he said. "Let's go."

"Georgio's ship is a four-place cabin amphibian," Sarnoff said. "We'll have to get some altitude going over the mountains, but we'll be warm enough without flying clothes."

"You have charts?" Bill asked.

"Yes," Cianelli said.

"Remember," Sarnoff warned, "we will shoot your head off if you make one false move. Georgio can fly the ship in an emergency. We will not be at your mercy when we get in the air."

"I'll remember," Bill said grimly.

Ten minutes later the three men stepped from the long black limousine that took them from the chateau to the little storm-locked cove nestling far below it.

Bill's hopes took a jump as he saw the beautifully stream-lined Wuppertal-Pavia amphibian that stood on the inclined turntable at the water's edge. A man who had the face of a mountain bandit spoke respectfully to Sarnoff and Cianelli in rapid Italian, gazing at Bill suspiciously.

Bill dropped into the pilot's seat a moment later and ran the powerful six-hundred-horsepower Dumo motor in while Sarnoff and Cianelli arranged themselves in the seats behind him.

He cut his throttle as the ship slid down off the turntable and shouted, "I want to see how she responds before I take her off."

They nodded their heads, and Bill opened his throttle to taxi down the length of the little cove, gradually getting the tail up while he increased his speed and felt out the controls. Then he lifted the ship off the water a few feet to get the center of gravity and the changing lift of the wing and the response of the rudder and flippers and ailerons before he set her down again.

"Fasten your belts!" he shouted at them as he taxied back into the wind.

The water was perfectly smooth as he gunned the engine and the prop of the low-winged monoplane bit into the cool night air. He whipped it off the water and came around a few moments later in a long climbing turn as he reached for the chart Cianelli had given him to plot his course.

He was certain now that the ship would do what he asked it to if the opportunity presented itself.

He rolled quietly on his side so that he could see the two dim figures just ahead.

IX—TELLTALE MANEUVER

"CIRCLE low above the field at Pozno," Cianelli shouted in his ear after he had leveled off on a northeast course. "When you see ships coming off the field get up to eight thousand feet and wait for them to fall in beside us. There will be eight of them. Seven of them will form a V with you in the center. The eighth will fly above you to give you your course. Follow him."

Bill nodded his head and twenty minutes later he hit the semimilitary airport at Pozno exactly on the nose. He cut his gun and circled low above the field until he saw the low-wing cantilever monoplanes of all-metal construction below him begin to scud into the air at an amazing speed. He studied the single-seater fighters closely as they raced above him in tight spirals, and knew that they were capable of at least three hundred and forty miles an hour. He saw that each of them had two fixed machine guns set in the fuselage that fired through the airscrew, and two automatic guns mounted in the wings.

He watched the leader who had gone out in front and above the V that had been formed around him, and followed his course. They were cruising at two hundred and twenty-five miles an hour, and Bill had to use all the skill at his command to keep the heavier amphibian from shaking apart at such speed. He knew now why Cianelli had not wished to fly his own ship.

When the leader stuck the nose of his fighter up in a swift climb a half hour later, with the rest of the escort nosing steadily up behind him, Bill lifted the nose of the Wuppertal-Pavia and followed them up to fifteen thousand feet. He could see high-cragged mountains jutting up interminably below them as a false dawn crept out of the east. He could feel Sarnoff's beady eyes boring into the back of his neck, and knew that he was watching his every move.

As the sun crept out of the east the leader of the little flight dropped his nose and the rest dropped with him. They leveled off at eight thousand feet again, and below them now was a checkerboard of greens and browns and reds.

Bill looked at the watch on his wrist and checked his instruments as best he could. He knew that they would reach their destination within the next thirty minutes, and he was still trying desperately to think of some manner in which he could get possession of the string of pearls Sarnoff carried and destroy it.

He had almost entirely given up hope when he saw the leader above him suddenly wiggle his ailerons and rock his wings. Bill knew that in the language of most of the combat airmen in the world that meant he had sighted what he thought was an enemy plane and was telling them to close up their formation.

The next instant Bill's heart climbed up into his mouth as he looked through the transparent hatch over his head and saw his own Charger and three of his Snorters speeding above them, on the same course, below a bank of cirrus clouds.

"Careful, Barnes!" Sarnoff snarled behind him as Bill tried to rock the big amphibian in the hope his men would see and understand. "Hold to your course and don't try to get out of the formation or I'll shoot you in the back."

Bill forgot all about Sarnoff as he saw the nose of his own Charger drop in a way that told him Shorty's hand was wrapped around the controls. He saw it drop as the three Snorters kept directly on their course, and he knew that the nose was pointed straight at the ship he was flying.

Down, down and down the Charger plunged as the leader of the single-seaters peeled off to meet his attack. Bill's shoulders involuntarily hunched up around his neck as he waited for the first burst of fire from the powerful .50-caliber Brownings in the Charger.

Then he felt the big amphibian lurch and heard the crash of bullets as they tore through the tail and raked forward into the cabin behind him. He heard Cianelli scream the cry of a wounded animal as a bullet drove into his body, and felt him collapse against the back of his chair.

He saw the Charger pulling out of its dive in a climbing turn with the leader of the single-seaters hard on his tail, and he knew that he, Bill, was facing certain death unless he could let Shorty know he was piloting the amphibian.

As Shorty streaked above him again with the leader of the single-seaters far behind, Bill nosed the amphibian down with the engine fully gunned. He heard Sarnoff screaming at him, but paid no attention. He did not know whether the amphibian could stand the strain of the maneuver he was going to try to execute. But he knew Shorty would realize he was at the controls of the amphibian if it didn't fall apart, because it was a maneuver that only he and Shorty could execute.

He eased the nose of the big ship out of its dive with that delicacy which is born of instinct and experience. The ship shuddered and the engine screamed as he brought it up until the nose was pointed straight at the heavens. Then he jammed down the rudder and pulled the stick over. The big ship screwed the air like a whirling dervish three times, then slid off on its tail toward the earth. For that fraction of a second that is the difference between life and death he fought frantically for control. Then he leveled the amphibian off and anxiously scanned the air for Shorty.

An instant later the Charger came zooming up by him to go over on its back and roll level in a flashing Immelmann, and tore back. As it went by, Shorty's arm shot out above his head and his hand flipped recognition. Bill wiped the perspiration from his face and cursed with relief.

Bill looked into the cabin behind him now and his eyes widened in horror as he saw that Cianelli had been struck by half a dozen bullets and was stretched out on the deck, dead. Sarnoff was lying half on top of him, unconscious. His head was lacerated and bleeding in half a dozen different places from the pounding he had taken when Bill had stuck the nose of the amphibian up to make a flying corkscrew of it.

Bill lifted the nose of the amphibian to get above the deafening and bewildering fight that was taking place off to his left. Tracer smoke, white and yellow, rose in the dull haze of dawn as his three Snorters and the Charger tore like four mad bulls through the alignment of the enemy ships. Bill's eyes glittered with pride as he watched his men avoid the murderous attacks of the single-seaters.

He saw Shorty whip the Charger through the roaring heavens with the reckless abandon of a man gone berserk. Enemy planes skidded crazily out of his path to escape his lightninglike maneuvers. He saw a single-seater zoom and go far over on its side, its rudder biting into the air, to swing in a tight circle.

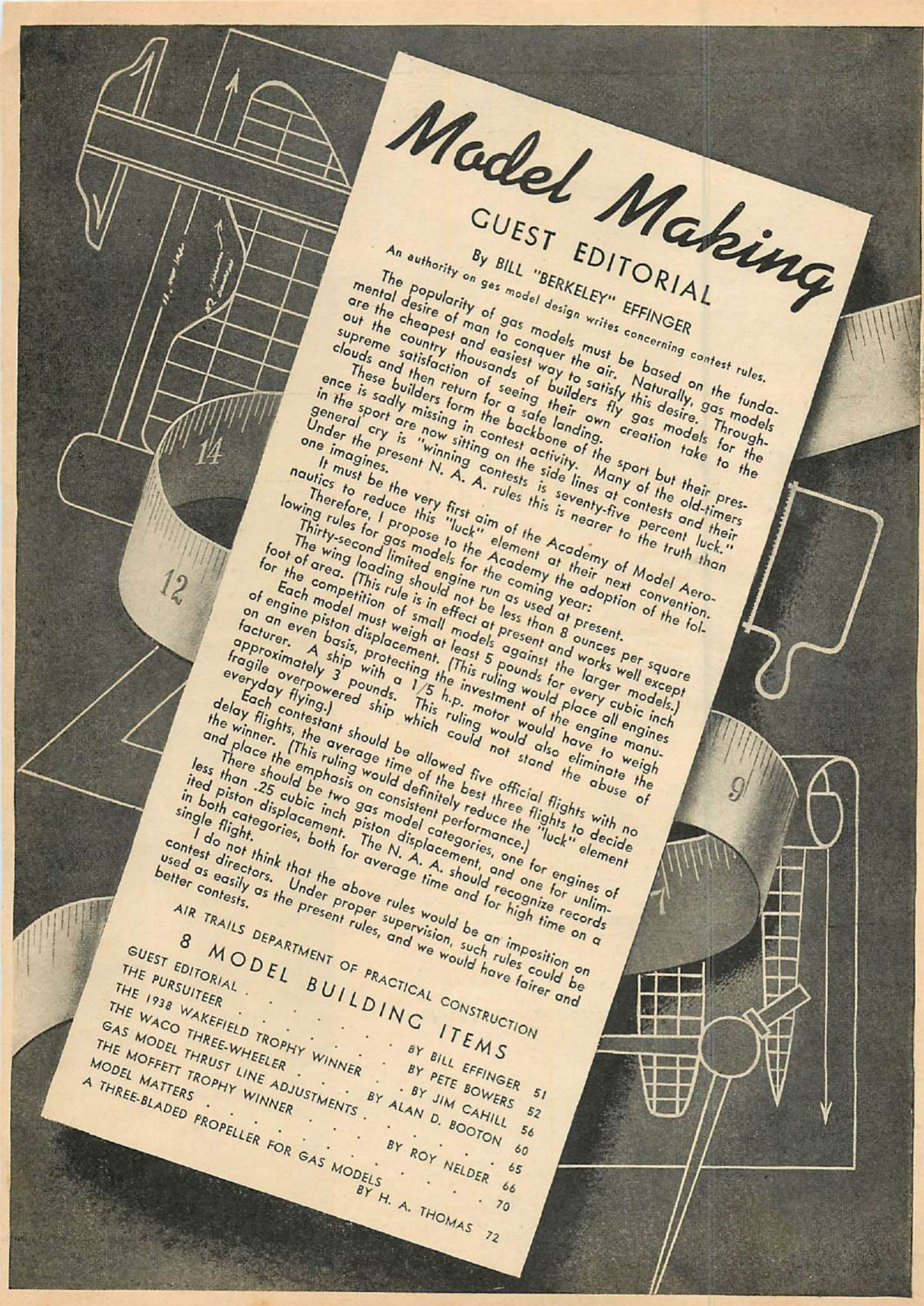
The first burst from Shorty's guns as he cut in on the ship's tail tore the rudder from its post. As the single-seater slipped, Shorty smashed its center, his fire raking forward. The pilot shot out of his seat, then collapsed over the stick as the ship fell into a spin and started its journey earthward.

Bill wanted to shout a warning as he saw a single-seater hurtling down on Bev Bates from the top of the fight. Then he saw Bev roll his Snorter over on its side, just enough to get out of the line of fire. The next instant he brought his Snorter up in a tight loop and was on the tail of the single-seater as it came around in a tight vertical. His guns drew a line from rudder to engine. Oil and fire and smoke billowed out as the pilot went over the side.

He saw two ships trying to get Shorty in a cross-fire. Then he saw the guns in the tail of the Charger go into action. A single-seater skidded away on one wing out of control. At the same instant Shorty took the Charger up and around in a climbing turn to drop the nose and pour lead and death into the single-seater that had been riding on his starboard side.

An instant later Red Gleason zoomed high above the fight to throw a single-seater off his tail. Then his nose

(Turn to page 98)



Model Making

GUEST EDITORIAL

By BILL "BERKELEY" EFFINGER

An authority on gas model design writes concerning contest rules.

The popularity of gas models must be based on the fundamental desire of man to conquer the air. Naturally, gas models are the cheapest and easiest way to satisfy this desire. Throughout the country thousands of builders fly gas models for the supreme satisfaction of seeing their own creation take to the clouds and then return for a safe landing.

These builders form the backbone of the sport but their presence is sadly missing in contest activity. Many of the old-timers in the sport are now sitting on the side lines at contests and their general cry is "winning contests is seventy-five percent luck." Under the present N. A. A. rules this is nearer to the truth than one imagines.

It must be the very first aim of the Academy of Model Aeronautics to reduce this "luck" element at their next convention. Therefore, I propose to the Academy the adoption of the following rules for gas models for the coming year:

Thirty-second limited engine run as used at present.

The wing loading should not be less than 8 ounces per square foot of area. (This rule is in effect at present and works well except for the competition of small models against the larger models.)

Each model must weigh at least 5 pounds for every cubic inch of engine piston displacement. (This ruling would place all engines on an even basis, protecting the investment of the engine manufacturer. A ship with a 1/5 h.p. motor would have to weigh approximately 3 pounds. This ruling would also eliminate the fragile overpowered ship which could not stand the abuse of everyday flying.)

Each contestant should be allowed five official flights with no delay flights, the average time of the best three flights to decide the winner. (This ruling would definitely reduce the "luck" element and place the emphasis on consistent performance.)

There should be two gas model categories, one for engines of less than .25 cubic inch piston displacement, and one for unlimited piston displacement. The N. A. A. should recognize records in both categories, both for average time and for high time on a single flight.

I do not think that the above rules would be an imposition on contest directors. Under proper supervision, such rules could be used as easily as the present rules, and we would have fairer and better contests.

AIR TRAILS DEPARTMENT OF PRACTICAL CONSTRUCTION

8 MODEL BUILDING ITEMS

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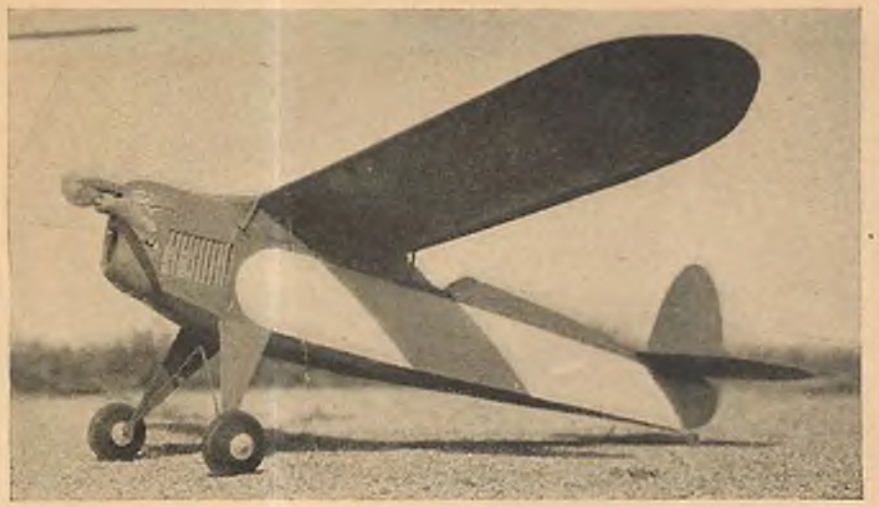
A THREE-BLADED PROPELLER FOR GAS MODELS . . . . . BY H. A. THOMAS 72



THE PURSUITEER

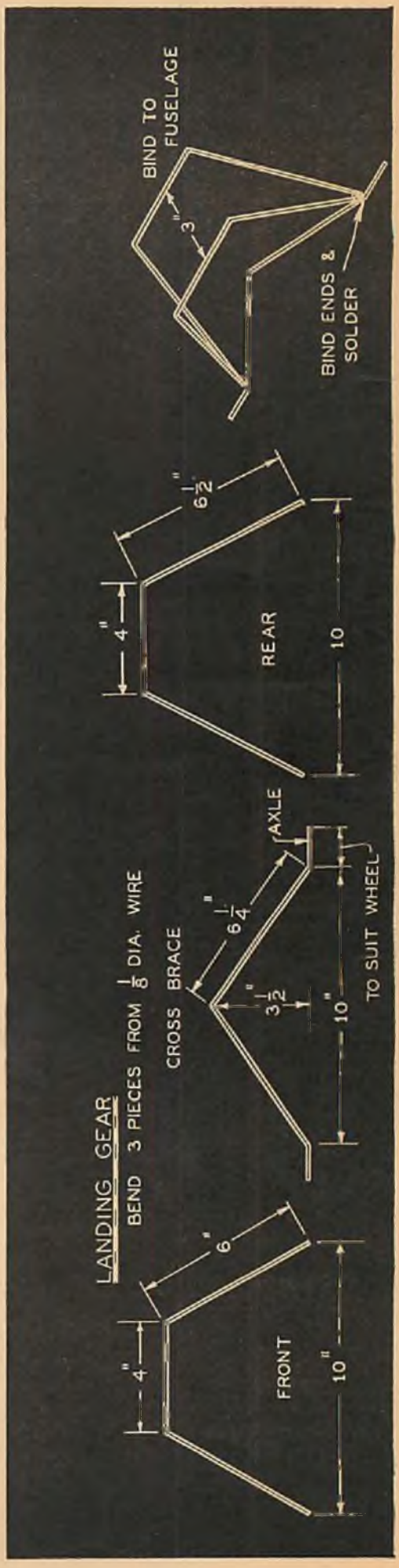
By PETER BOWERS

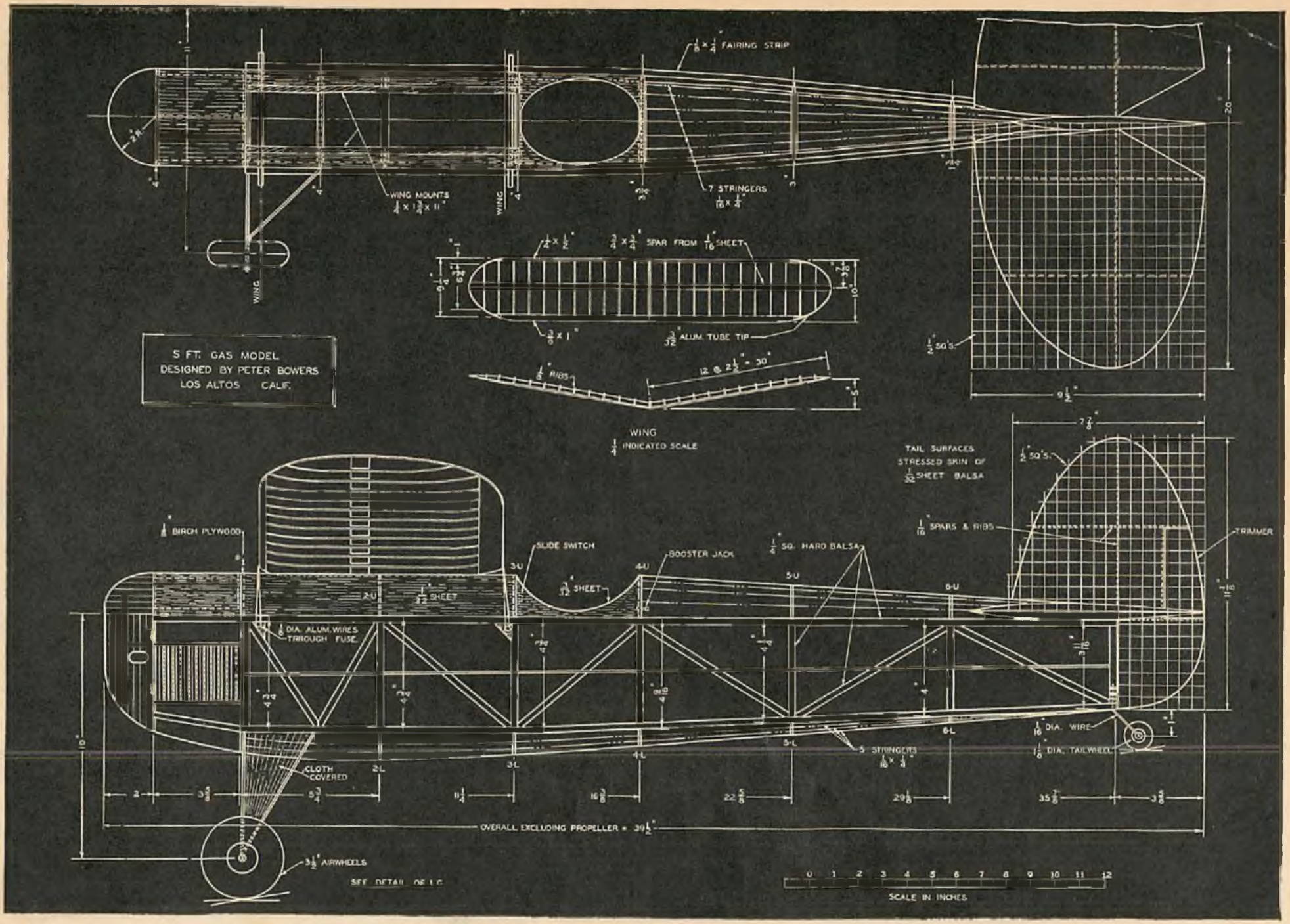
HERE is a model which, though it has never broken a record or been entered in a contest, has nevertheless been flying for nearly two years. It has been used mainly as a test ship for the development and testing of new gadgets for the author's other ships. The model is a steady and consistent flier, and is simple enough in its construction for anyone to build, whether he has had any previous gas-model experience or not. Read instructions thoroughly before starting to build.

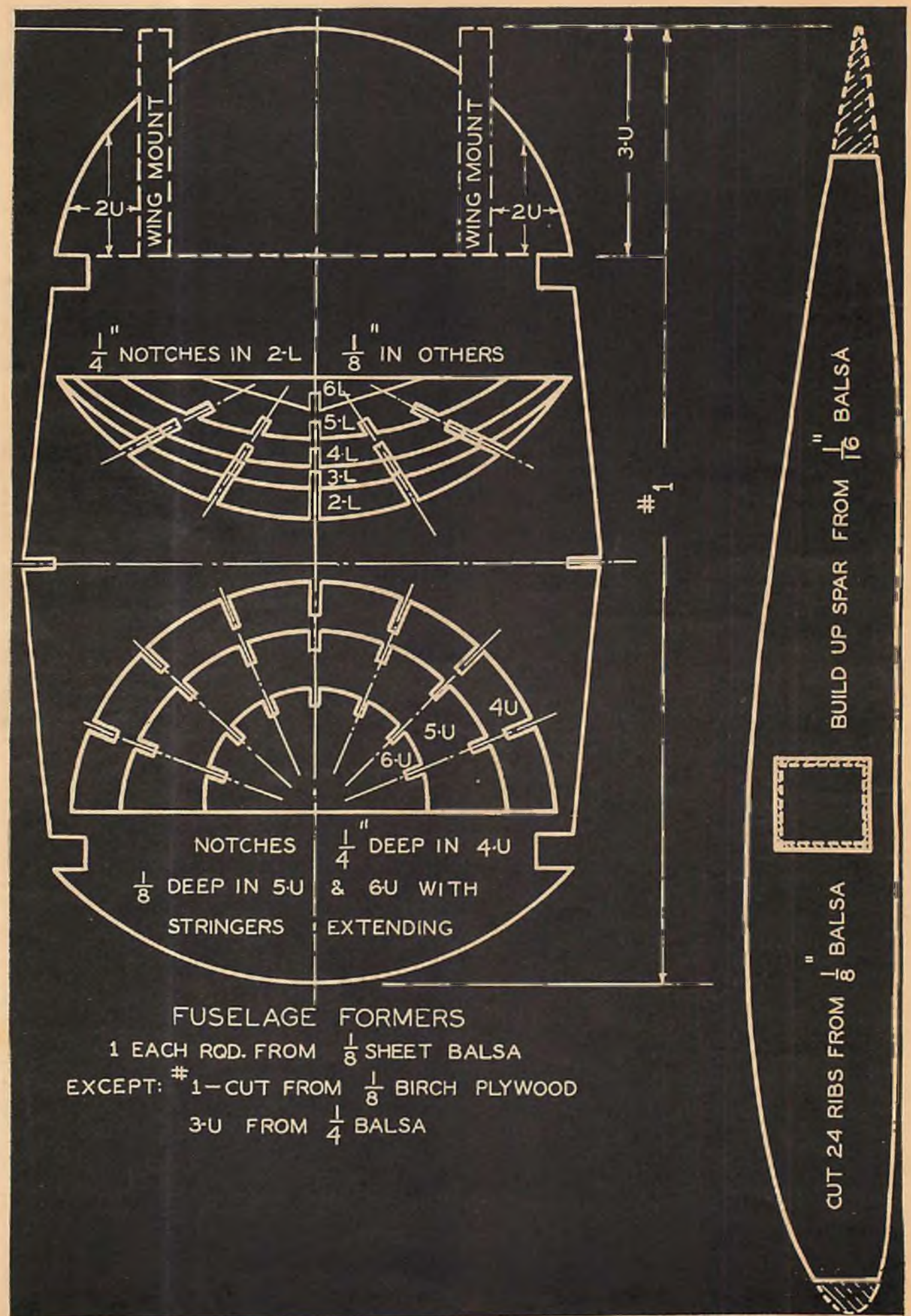
FUSELAGE

First, draw out a full-size side view of the fuselage and lay out the longerons, laying a sheet of wax paper over the drawing first. Leave ⅛" of the longerons in front of the first upright. (Former #1.) While one side frame is drying, trace the full-size former drawings on the indicated sizes of sheet balsa and cut them out with a razor blade. After the first frame has dried, remove it and lay down the other side. Now make the landing-gear struts from steel wire. Remove the second side frame from the drawing, cut the right number of cross pieces to the lengths indicated on

A snappy gas model, simple enough for anyone to build regardless of experience.




5 FT. GAS MODEL
DESIGNED BY PETER BOWERS
LOS ALTOS CALIF.
WING
INDICATED SCALE
TAIL SURFACES
STRESSED SKIN OF
SHEET BALSA
SPARS & RIBS
TRIMMER
BIRCH PLYWOOD
SLIDE SWITCH
BOOSTER JACK
SQ. HARD BALSA
SHEET
DIA. ALUM. WIRES
THROUGH FUSE.
CLOTH
COVERED
5 STRINGERS
DIA. WIRE
DIA. TAILWHEEL
OVERALL EXCLUDING PROPELLER = 39½"
AIRWHEELS
SEE DETAIL OF L.G.
SCALE IN INCHES

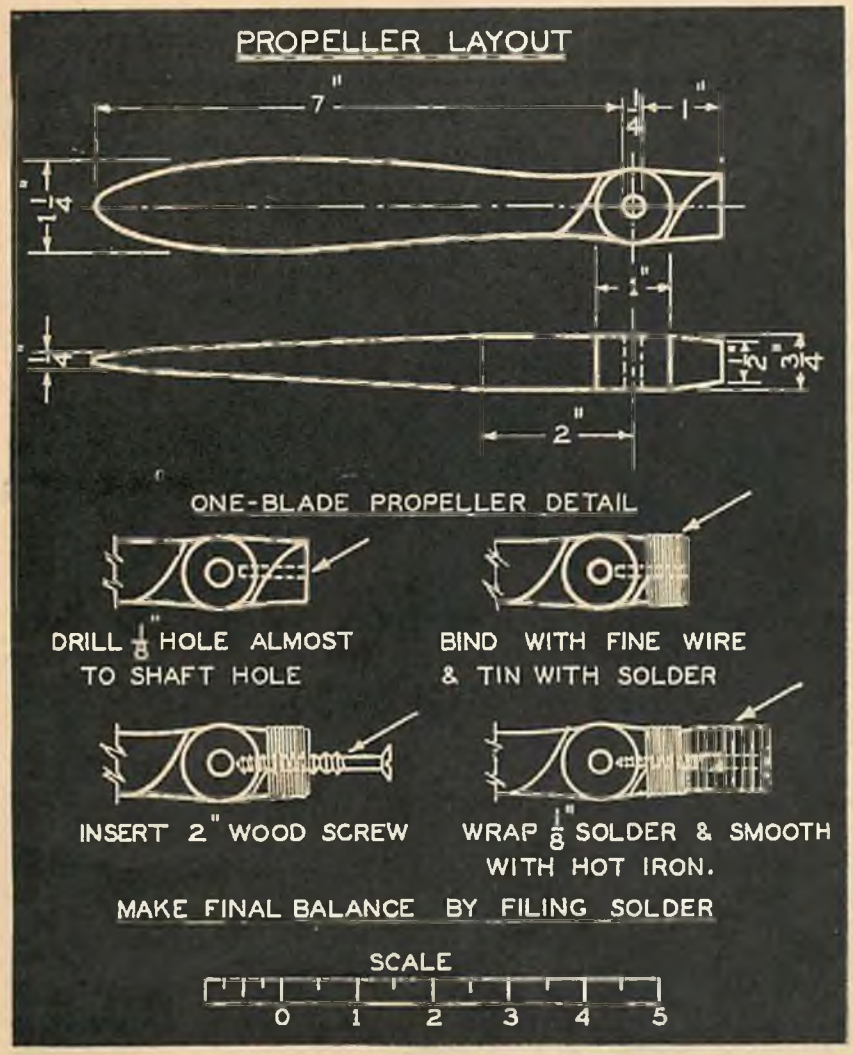


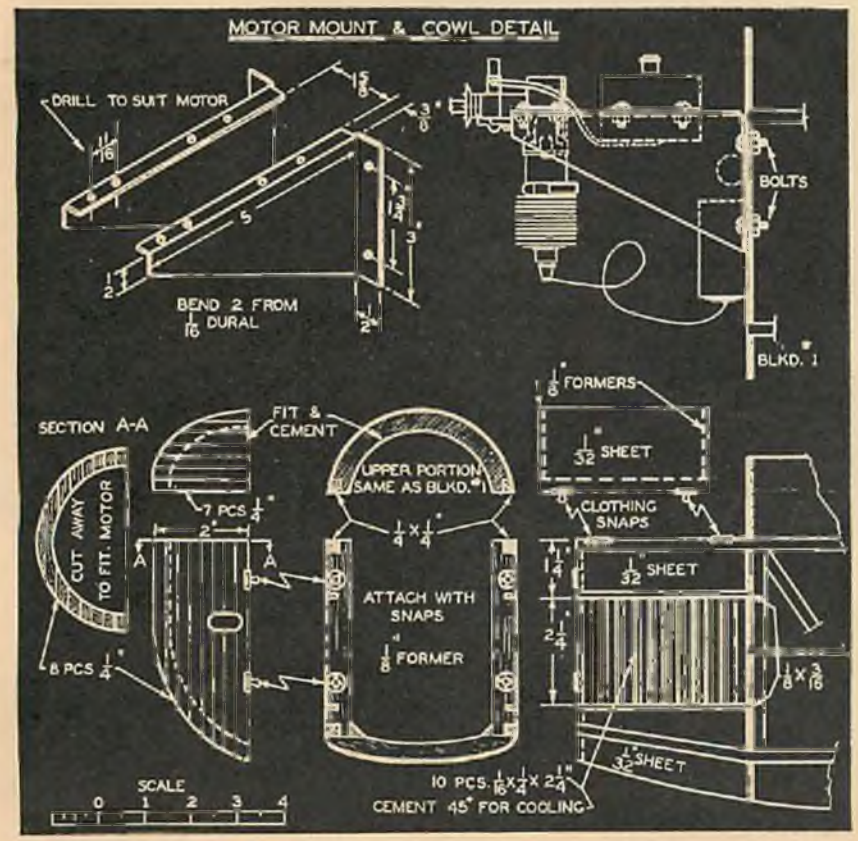
FUSELAGE FORMERS

1 EACH RQD. FROM 1/8 SHEET BALSA

EXCEPT: #1 — CUT FROM 1/8 BIRCH PLYWOOD

3-U FROM 1/4 BALSA





the drawings, and assemble the fuselage. (Notice that the fuselage width measurements are from the *outsides* of the longerons. Since the longerons are of quarter-inch stock, subtract one half inch from the measurement for the lengths of the cross braces.) When the sides are assembled, put on the landing-gear struts. This must be done before the bottom formers are put on the fuselage. Bind the landing-gear wires to the cross-pieces with thread and cement.

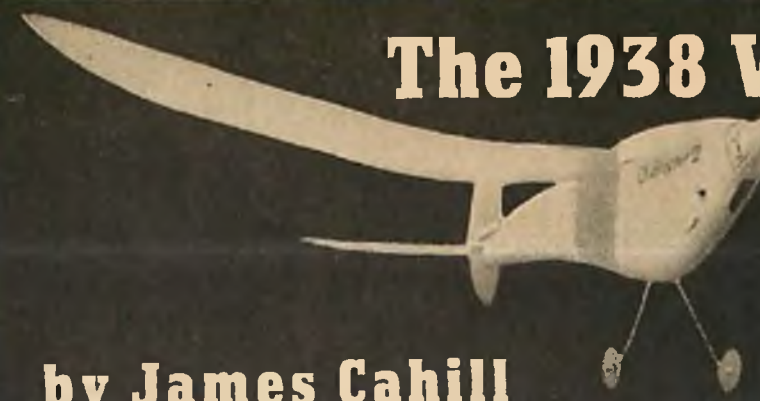
Bind the lower ends of the struts together with fine iron wire and solder well. Fit the No. 1 birch bulkhead on over the stubs of the longerons and cement well, as this is the bulkhead that carries the motor mount. Before putting on the top stringers, make and install the tail surfaces. The type of construction used in the tail surfaces is one that has proven itself very satisfactory, both in ease of construction and in durability and freedom from all warping tendencies. If sheet balsa cannot be obtained in the required width, cement several sheets together side by side. All that is needed to give the tail its cross section is one spar and two ribs to a side.

MOTOR MOUNT AND COWL

The motor mount, too, is one that has been developed over a period of time and has proven itself. Its advantage over the beam type for lug-mounted motors is that the amount of side thrust can be adjusted. All that you have to do is insert washers under the bolts on one side or the other. With this type of mount, too, the ship is liable to much less damage in head-on collisions.

At first this model had a one-piece cowl, but it was a nuisance in that the propeller and needle valve had to be removed when one wanted to change plugs or clean the points. Furthermore, at times it was desirable to fly the ship without a cowl, and this displaced the center of lateral area too far, so the present three-piece type was built, with one part integral with the fuselage. The frame of this main part is just a continuation of the longerons, with a balsa bulkhead in front. The cooling holes are strips of 1/16 x 1/4" balsa inserted between two parallel 1/8 x 3/16" strips of balsa. The rest of this section is covered with 1/32" sheet balsa. The front section is built up of 1/4" sheet, as is the front part of the top. No definite dimensions or shapes are given for these, as their size and shape will *(Turn to page 80)*

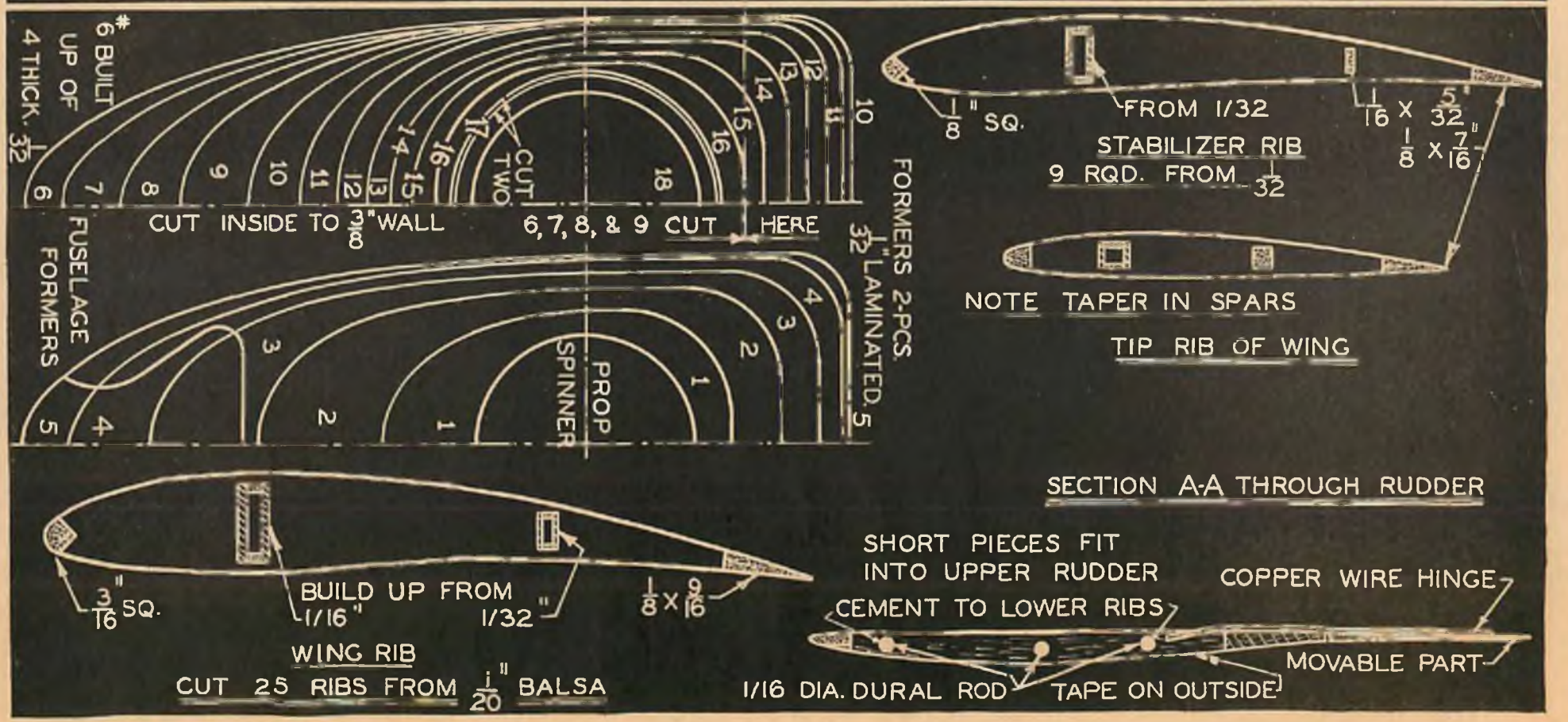
The 1938 WAKEFIELD TROPHY WINNER

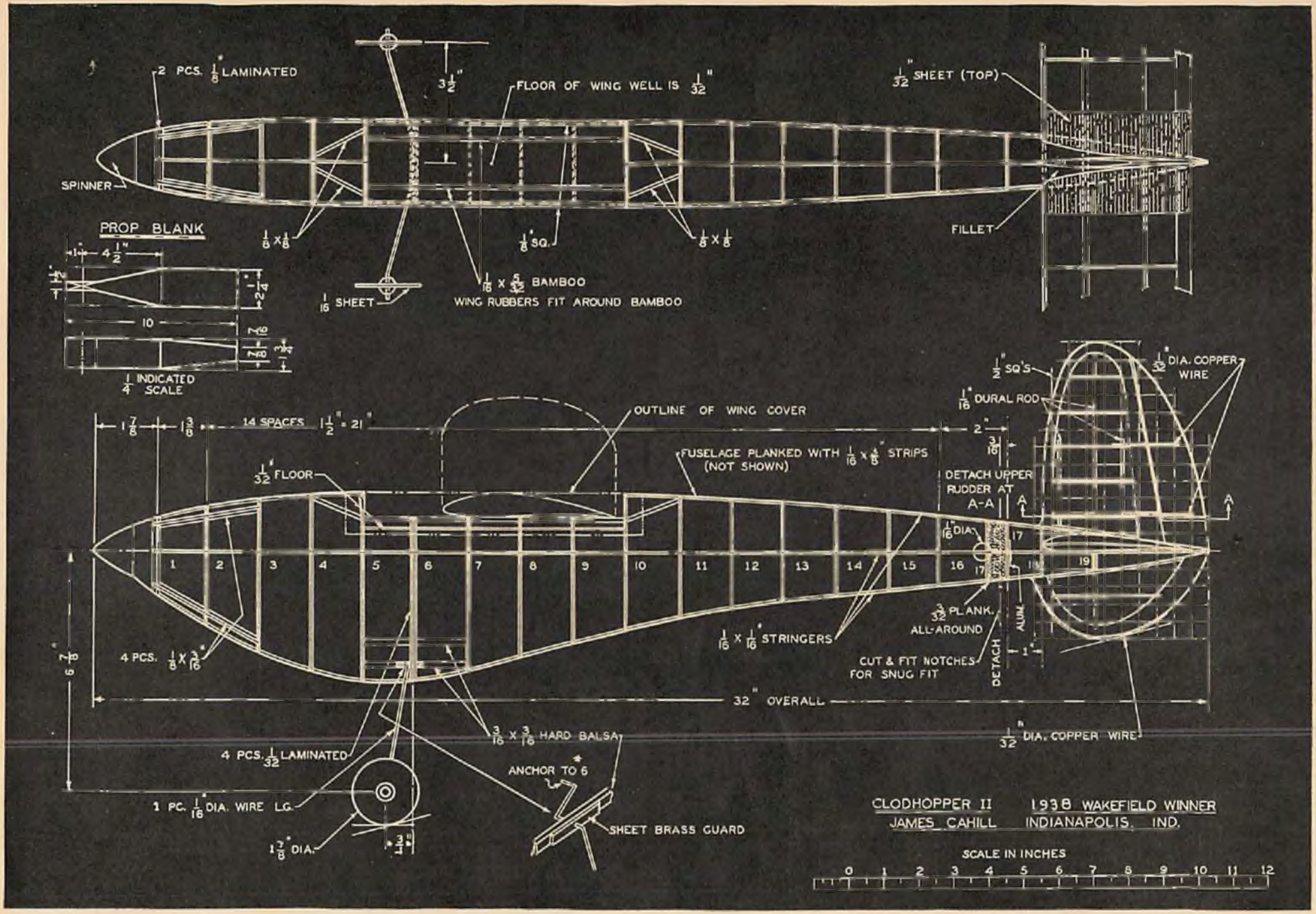


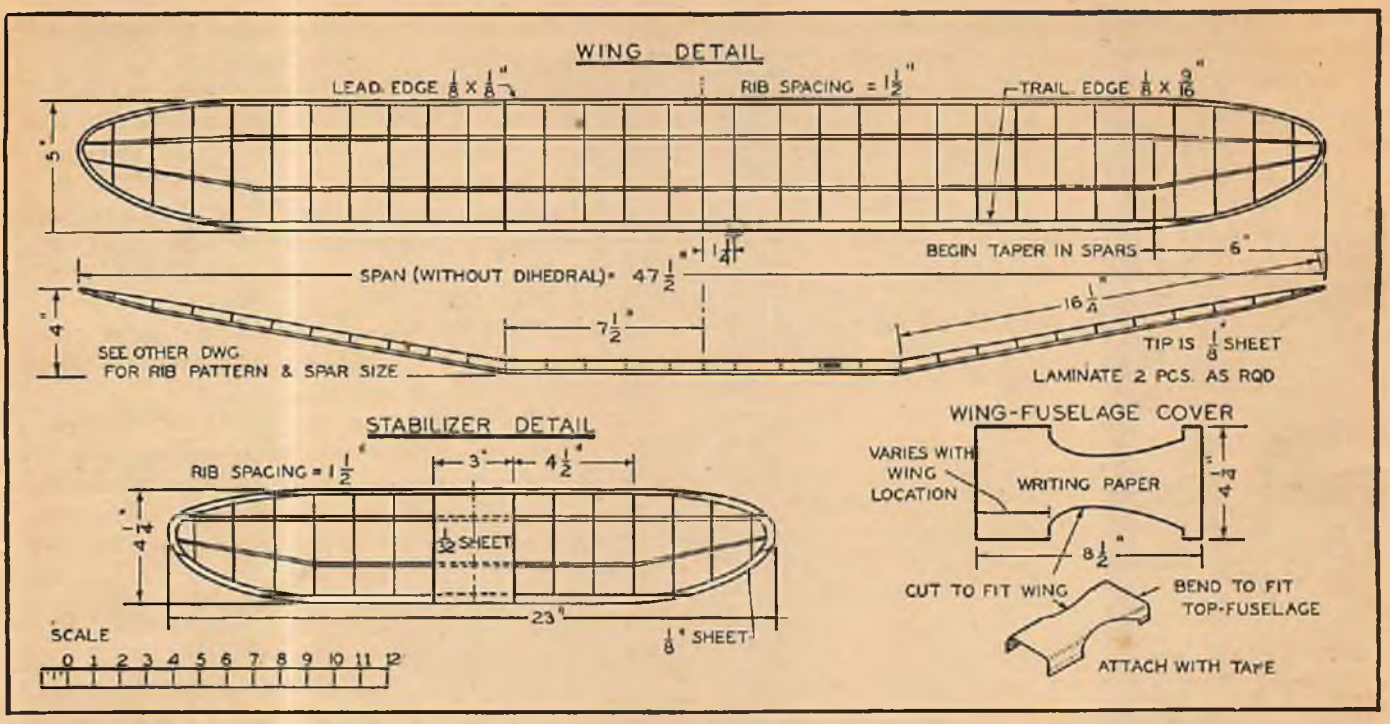
by James Cahill

Preface by editors—The Clodhopper II, Moffett winner in 1937, top-time ship in 1938 Wakefield American eliminations, and winner in Paris of the Wakefield Trophy, was published originally in the November, 1937, Air Trails. The directions given here are those for the 1937 version of the ship. Cahill has enumerated the changes made for the 1938 season. These are listed just before the construction directions.

It's quite a big feat to get Jim Cahill to talk about his ship. *(Turn to page 58)*

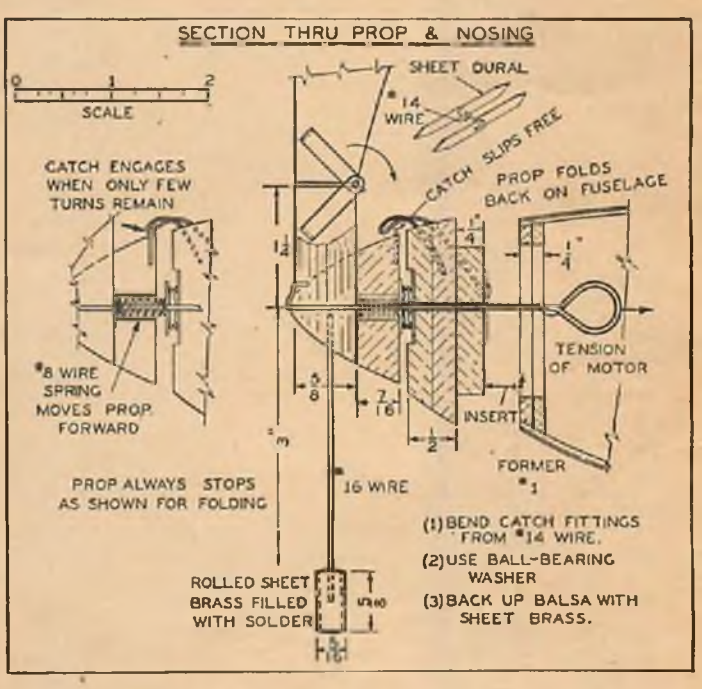



2 PCS. 1/8" LAMINATED
3 1/2"
FLOOR OF WING WELL IS 1/32"
1/32" SHEET (TOP)
SPINNER
FILLET
PROP BLANK
4 1/2"
1/8 X 1/8
1/8" SQ.
1/8 X 1/8
1/16 SHEET
1/16 X 5/32 BAMBOO
WING RUBBERS FIT AROUND BAMBOO
10
1 INDICATED
1/4 SCALE
1/2" SQ'S
1/32" DIA. COPPER WIRE
1/16" DURAL ROD
OUTLINE OF WING COVER
1 7/8
1 3/8
14 SPACES 1 1/2" = 21"
2"
3/16
FUSELAGE PLANKED WITH 1/16 X 1/8" STRIPS
(NOT SHOWN)
1/32" FLOOR
DETACH UPPER
RUDDER AT
A-A
A
A
1/16" DIA.
17
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
3/32" PLANK
ALL-AROUND
1/16 X 1/16" STRINGERS
ALUM.
DETACH
1"
CUT & FIT NOTCHES
FOR SNUG FIT
4 PCS. 1/8 X 3/16"
32" OVERALL
3/16 X 3/16 HARD BALSA
1/32" DIA. COPPER WIRE
4 PCS. 1/32 LAMINATED
ANCHOR TO 6
1 PC. 1/16" DIA. WIRE LG.
1 7/8" DIA.
3/4"
SHEET BRASS GUARD
CLODHOPPER II 1938 WAKEFIELD WINNER
JAMES CAHILL INDIANAPOLIS, IND.
SCALE IN INCHES
0 1 2 3 4 5 6 7 8 9 10 11 12



THE 1938 WAKEFIELD TROPHY WINNER

Yet the following illustrates his feeling for the Clodhopper II: "The crate seemed to have a wonderful affinity for thermals. It doesn't have a wonderful climb, just enough to get up. It can wander around and find a thermal even while being outclimbed by other ships. It seems to hang around. I really hate to fly the crate after I get it repaired, because it has had such marvelous luck and I know it is bound to run out sometime."



MODIFICATONS FOR 1938 SEASON

The wing is covered with ordinary tissue and doped with red dope. It has about 1/2" more dihedral in each side, and comes apart in the center for packing. There are four 1/16" dural rods fitting into aluminum tubes, one on leading and one on trailing edge, and one each on top and bottom of the big center spar.

The elevator has a section cut out on each side near the center to bring it down to about thirty-two percent of the wing area. Rudder has aluminum tubes which let it come apart. The crate can be packed into a very small box if necessary. The rudder is held on with interior decorators' Scotch tape, the same as the cover over the wing. The wing cover is made of writing paper this year instead of sheet aluminum.

The prop counterweight is located about three inches from the center now and is attached by only one wire, about #16 gauge. Approximately a half inch was taken off the end of the propeller blade, which was then reshaped. Eighteen strands of quarter were used this year instead of sixteen, but the same length of motor remained. Sandpaper was glued on the bottom of the wing to keep it from shifting around.

DIRECTIONS FOR BUILDING ORIGINAL *SHIP*

FUSELAGE

All bulkheads are made of light-grade 1/32" sheet balsa cemented cross grain. Four light stringers of 1/16 x 1/16 x 36" are used to assemble the bulkheads and hold them in position for planking. The planking is put on in strips of 1/16 x 3/8 x 36". These planks are cut to a narrower width wherever it is necessary to get around the sharp corners of the bulkheads. All landing gear and nose reinforcements (3/16" square at the landing gear and 1/8 x 3/16" at the nose) are added before the planking is started.

The tops of formers #6 to 10 inclusive are cut off to provide a flat surface for mounting the wing. The wing fits onto this flat section of the fuselage. It is covered by an aluminum sheet cover, which fits over the wing and is bent around formers #5 and 10. This cover is attached by strips of interior decorators' masking tape.

After planking, the fuselage is sanded smooth and is given a coat of wood filler. Follow with U. S. army #4 yellow dope with sandings of finest sandpaper, before and after each coat.

PROPELLER AND NOSING

The one-blade folding propeller is the most novel feature of the design. The propeller is cut from a block 1¼ x 2¼ x 10". The one blade is cut in the conventional way. After shaping the blade it is covered with silk and a coat of wood filler is added. After the propeller has been mounted to the hub and all necessary cementing has been done, the propeller is given a coat of red dope, with intermittent sanding. And, as a last step, apply a coating of wax and rub the surface to a high luster.

The propeller blade is hinged to the hub with dural hinges and #11 music-wire hinge pin. The propeller blade should be cut away to permit the hinge to fit flat against the propeller surface. The edges of the dural hinges are burred with a file to provide a better cementing surface.

The balance weight for the propeller is a piece of sheet brass rolled cylindrically and filled with solder. It is mounted to the propeller hub by a loop of #14 music wire. It should be of sufficient weight to balance the balsa propeller blade.

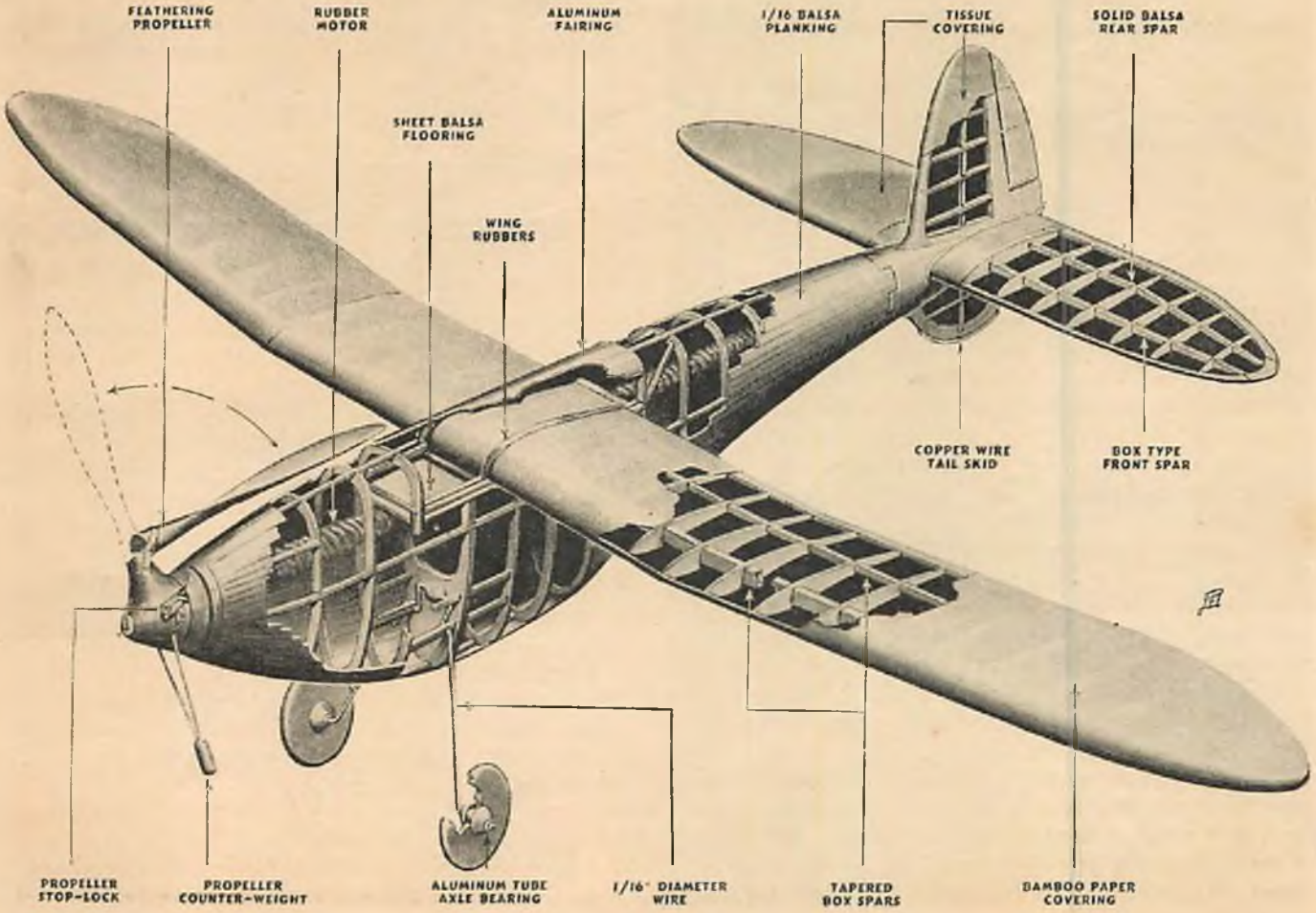
The propeller spinner has a piece of wire on it which engages a piece of music wire (attached to the nose plug) at the proper time. This "catch" has three purposes: stop the propeller from free-wheeling; stop it at the same position each time, to get least resistance from the folding blade; prevent slack in the rubber from moving back and forth in the fuselage and disturbing the balance of the model. And, in addition, this tension which remains in the rubber eliminates the use of hooks in the nose and tail plugs, as the rubber exerts sufficient tension to keep them in position.

The propeller "stopper" operates in the following way: When the tension of the rubber is strong, the hook on the spinner rides free. When the motor unwinds, the small wire spring inside the spinner forces the spinner forward and the hook on the spinner engages the loop of wire attached to the nose plug.

WING

Ribs are cut, using the template in the drawing. All the ribs are mounted on the two center spars before any of them are cemented in place. The spars are built up from pieces of $^1/_{16}$ and $^1/_{32}$" flat balsa. The size is indicated in the rip pattern. The spars taper toward the tip of the wing. At the tip, the rear spar changes from a hollow built-up to a solid spar.

The center of the wing is flat for a *(Turn to page 98)*

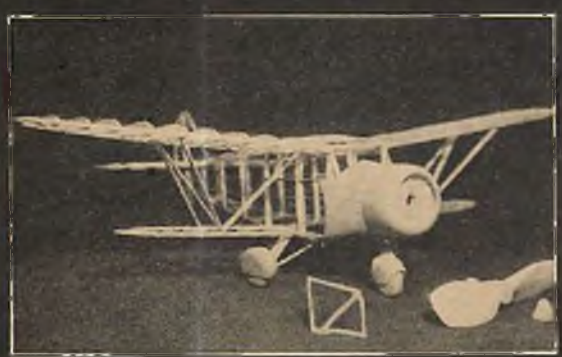


The take-off! The ship scoots along on its novel tricycle landing gear preparatory to easing off in climb.

This unposed picture of the miniature "N" shows it climbing. Stability is the keynote of its design.

THE WACO THREE-WHEELER

How the model is built. Note the simple, practical construction. Framework is very similar to real ship.



This photo of the framework shows the "tricycle" landing gear to advantage. The model lands neatly.

By Alan D. Booton

A really interesting flying model; simple, rugged and an unusually stable performer.

The Waco "N" series, incorporating the tricycle landing gear, are to be desired by sportsmen or businessmen who prefer an airplane that they can safely handle on take-offs and landings with apparent finesse, and still without the skill required by the conventional types of planes. It is claimed that the Waco "N" can be handled in departures and arrivals more easily than an automobile in traffic.

So get busy and build the model and see for yourself. The "little brother" gathers speed on a smooth runway and eases off in a low, climbing turn. Because of the simple construction, the model weighs less than two ounces, making longer flights possible.

For the builders' information, the design was taken directly from factory scale drawings, so the model, with scale tail surfaces and scale diameter propeller, is eligible for flying scale contests.

FUSELAGE

Build the two fuselage side frames of $^1/_{32}$" square strips. $^1/_{32}$ x $^3/_{32}$" square spacers are used at the front and rear. The stabilizer supports are $^1/_{16}$" sheet. Assemble the two sides with $^3/_{32}$" square spacers measured from the top view. Be sure that this much lines up before continuing.

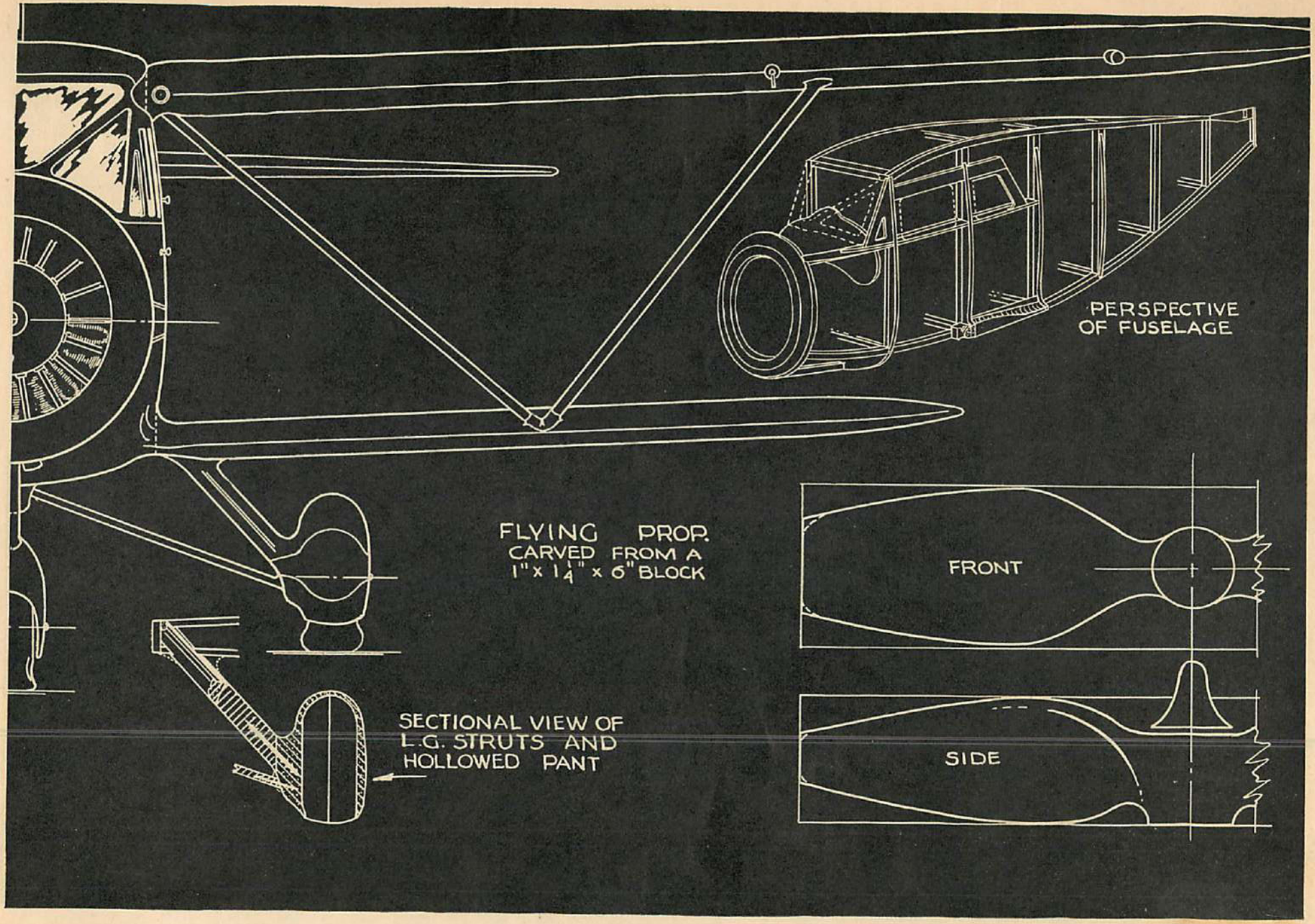
Cut all formers and instrument panel from $^1/_{16}$" sheet and the ring "A" from $^1/_4$" sheet, and cement them in their respective positions.

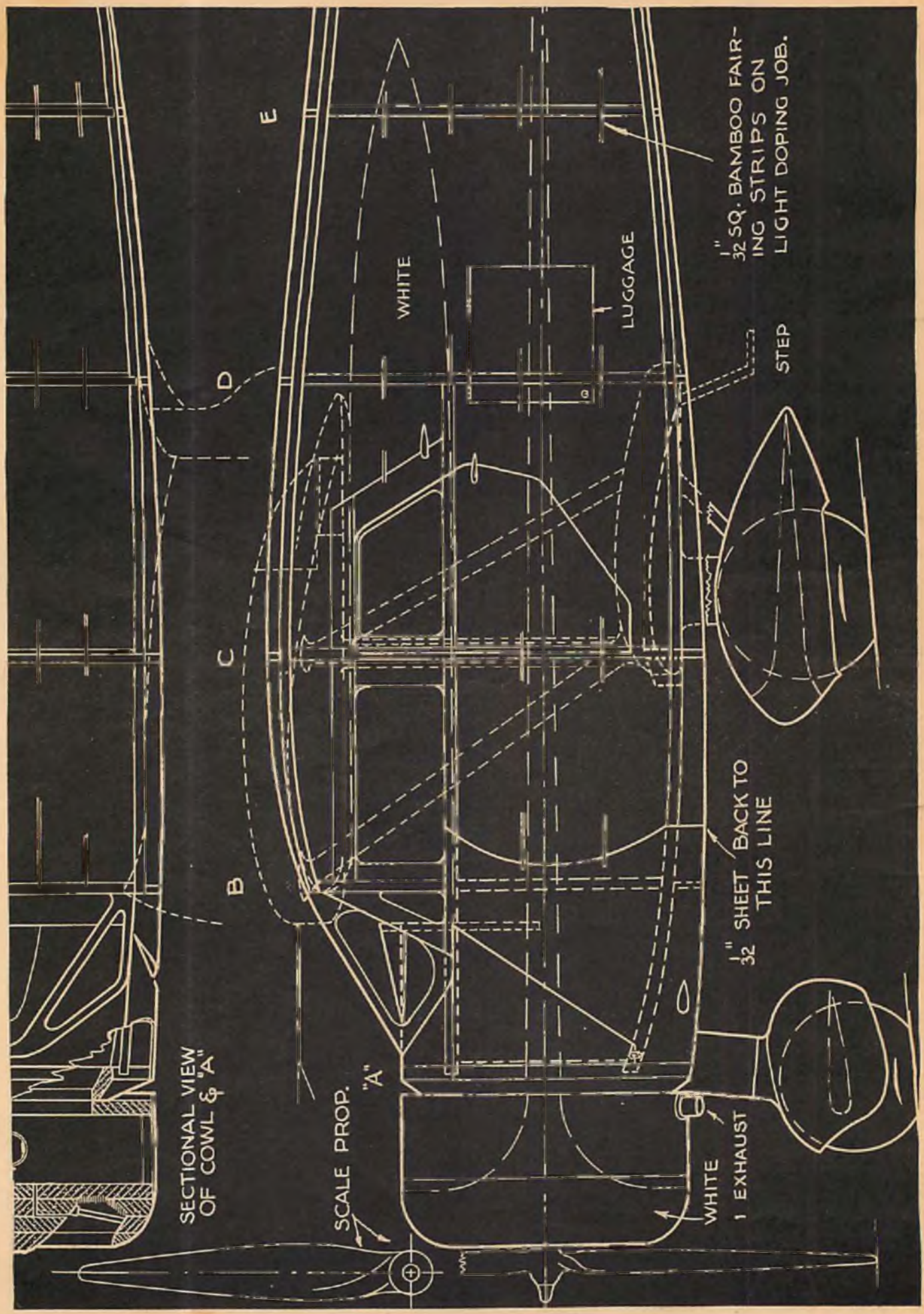
Note on the perspective drawing how the window "sills" have been filled out flush with the formers with $^1/_{16}$" sheet. After that is done, cover the front with $^1/_{32}$". sheet and add the $^1/_{16}$" window frames. The filler blocks at the lower wing bases (at C and D), shown in heavy broken lines on the side view, and as finished on the perspective, may be carved when the wings are in place temporarily.

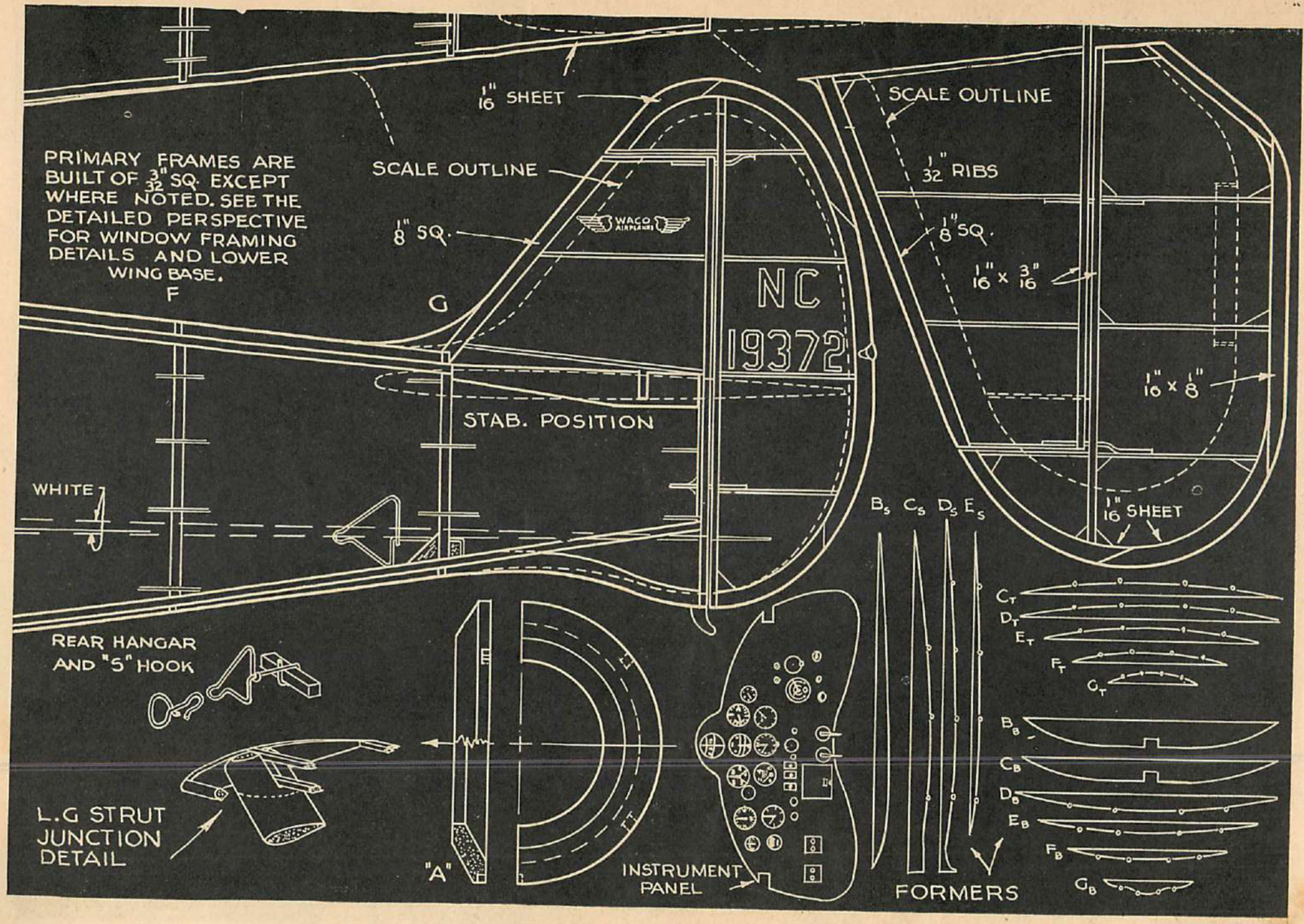
$^1/_{32}$" bamboo fairing strips are heavy enough for a lightly doped, colored-tissue model, but $^3/_{64}$" square strips should be used if several coats of dope are anticipated. Embed the strips in the wood where they start from the front, then cover the formers, to rest flush at the rear.

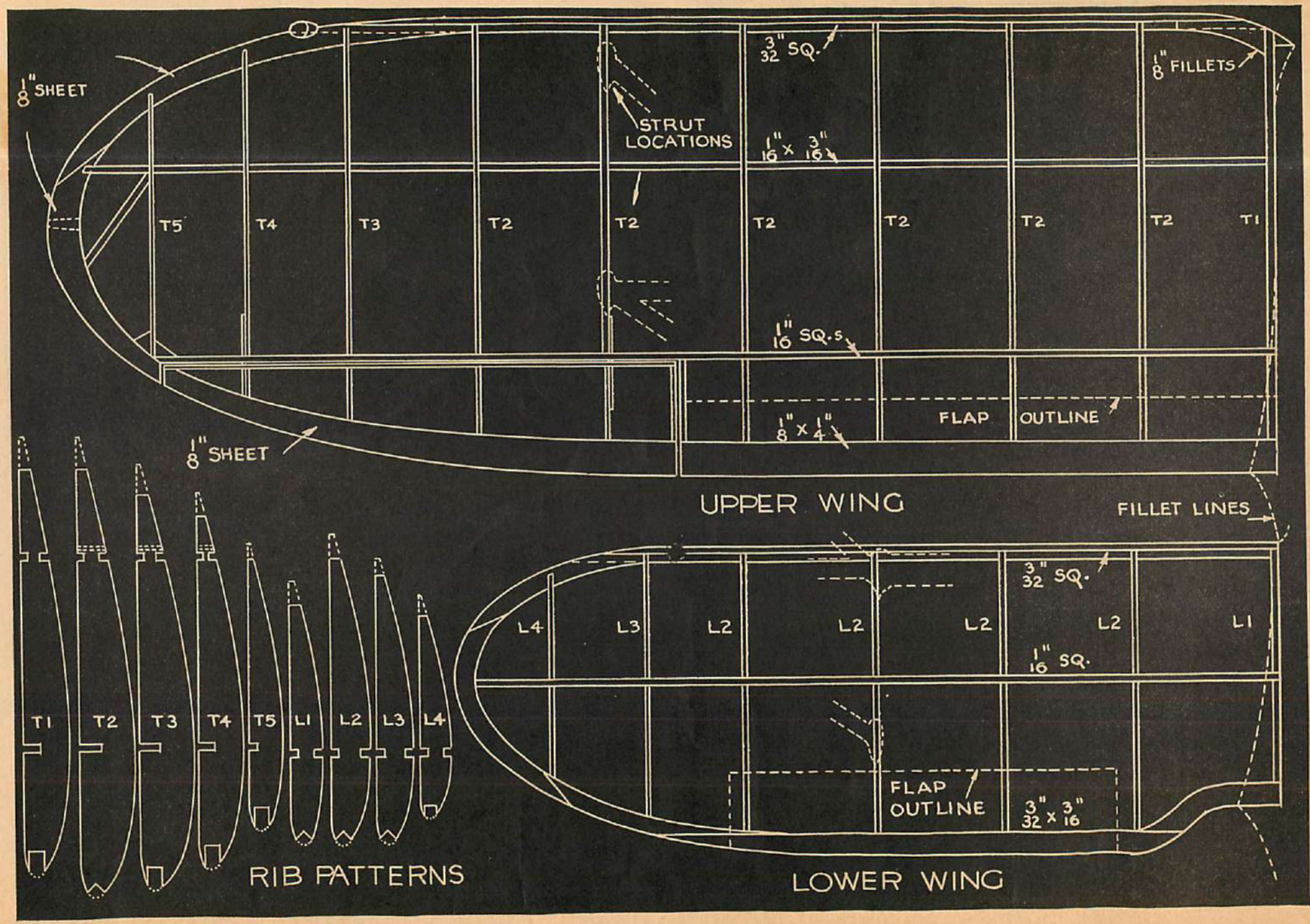
COWL

The front portion of the cowl is laminated with $^1/_8$" sheet rings and disks cut to the *(Turn to page 95)*


PERSPECTIVE
OF FUSELAGE
FLYING PROP.
CARVED FROM A
1"x 1 1/4" x 6" BLOCK
FRONT
SIDE
SECTIONAL VIEW OF
L.G. STRUTS AND
HOLLOWED PANT


SECTIONAL VIEW OF COWL & "A"
SCALE PROP. "A"
WHITE
1 EXHAUST
1/32" SHEET BACK TO THIS LINE
1/32" SQ. BAMBOO FAIRING STRIPS ON LIGHT DOPING JOB.
STEP
LUGGAGE
WHITE
A
B
C
D
E


1/16 SHEET
SCALE OUTLINE
PRIMARY FRAMES ARE BUILT OF 3/32" SQ. EXCEPT WHERE NOTED. SEE THE DETAILED PERSPECTIVE FOR WINDOW FRAMING DETAILS AND LOWER WING BASE.
F
1/8" SQ.
G
NC
19372
STAB. POSITION
WHITE
SCALE OUTLINE
1/32" RIBS
1/8" SQ.
1/16" x 3/16"
1/16" x 1/8"
1/16" SHEET
Bs Cs Ds Es
CT DT ET FT GT
BB CB DB EB FB GB
REAR HANGAR AND "S" HOOK
L.G STRUT JUNCTION DETAIL
"A"
INSTRUMENT PANEL
FORMERS


1/8" SHEET
STRUT LOCATIONS
3/32" SQ.
1/8" FILLETS
1/16" x 3/16"
T5
T4
T3
T2
T2
T2
T2
T2
T2
T1
1/16" SQ.s
1/8" x 1/4"
FLAP OUTLINE
1/8" SHEET
UPPER WING
FILLET LINES
3/32" SQ.
L4
L3
L2
L2
L2
L2
L1
1/16" SQ.
T1
T2
T3
T4
T5
L1
L2
L3
L4
FLAP OUTLINE
3/32" x 3/16"
RIB PATTERNS
LOWER WING

GAS MODEL THRUST LINE ADJUSTMENTS

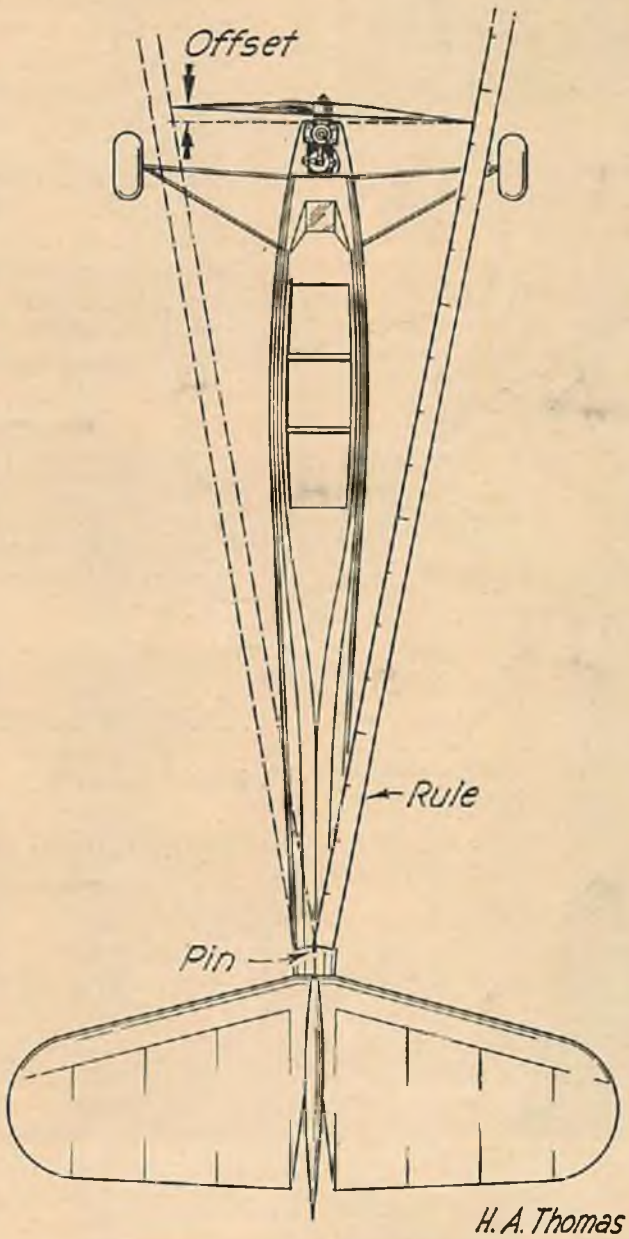
By J. L. SADLER and H. A. THOMAS

Very little time is required for the average gas model builder to discover the importance of proper thrust line adjustments. It is a simple matter to arrive at the correct down-thrust angle, and it may be easily retained by the use of washers. The trouble usually lies in the right or left thrust adjustments.

The method to be described here is used extensively by the Little Rock gas model builders and was originated by J. L. Sadler.

The engine lug holes should first be enlarged to about $\frac{1}{32}$" oversize. This will permit the engine to be shifted slightly for adjustments. The engine will *not* shift when the screws or bolts are tightened snugly. Washers should be used between the top of the lugs and the screw or bolt heads.

As the drawing shows, a pin is centered on the top of the fuselage, near the rear of the plane. With the propeller turned horizontally, a long rule is used to measure the distance between the pin and the right propeller tip. This dimension is recorded; the propeller is turned 180°, and the distance measured between the pin and the same propeller blade (which will now be on the left). The difference in the dimensions taken should be recorded. Each time measurements are made, the pin should be replaced in the same location.



If the model flew satisfactorily before the thrust line was measured, the builder is only concerned with preserving the adjustment he already has, but in case it did not fly well, the builder should use the dimension taken as a basis for making further adjustments.

Each time the engine is removed from the model, care should be taken to assure that it is replaced with the same thrust line adjustments. Should the model have any kind of collision or accident, it is the safe policy to check the thrust measurement before further flights are made. In case the model is to be flown with the engine operating at any great difference in speed, the builder should remember that there will be a different torque effect, which will probably require a thrust adjustment.

It has been our experience with gas models powered with one-fifth h.p. engines, that with the motor running anti-clockwise (when viewed from the front), the engine requires from ¼" to ⅜" offset to the right, measured by the method described.

Editor's note—The Little Rock group is indicative of progressive clubs throughout the country. From Little Rock has emanated numerous practical kinks. This article illustrates another of their ideas, a number of which appeared in the April issue. Air Trails is anxious to co-operate with all clubs, and would appreciate hearing from secretaries who know of some local practice that would prove beneficial to others.

THE 1938 moffett trophy winner

Roy Nelder holding the winning model. The design is interesting, the ship dependable, strong.

Another world's championship model—this time a Canadian design, winner at the 1938 Nationals

By ROY NELDER

THE United States has lost the Moffett Trophy for the second time in the six years it has been in competition. In 1936 at Detroit Vernon Gray of New Zealand won the trophy flying his entry by proxy. Canada has always sent a strong team to the Moffett contest, and their victory this year was the result of much serious preparation.

Nelder's winning flight was 5 minutes and 17 seconds. He had made a flight of 10 minutes and 37 seconds to win first place on the Canadian Moffett team in the eliminations held previous to the Detroit meet. Fortunately, the model was recovered undamaged after both these long flights.

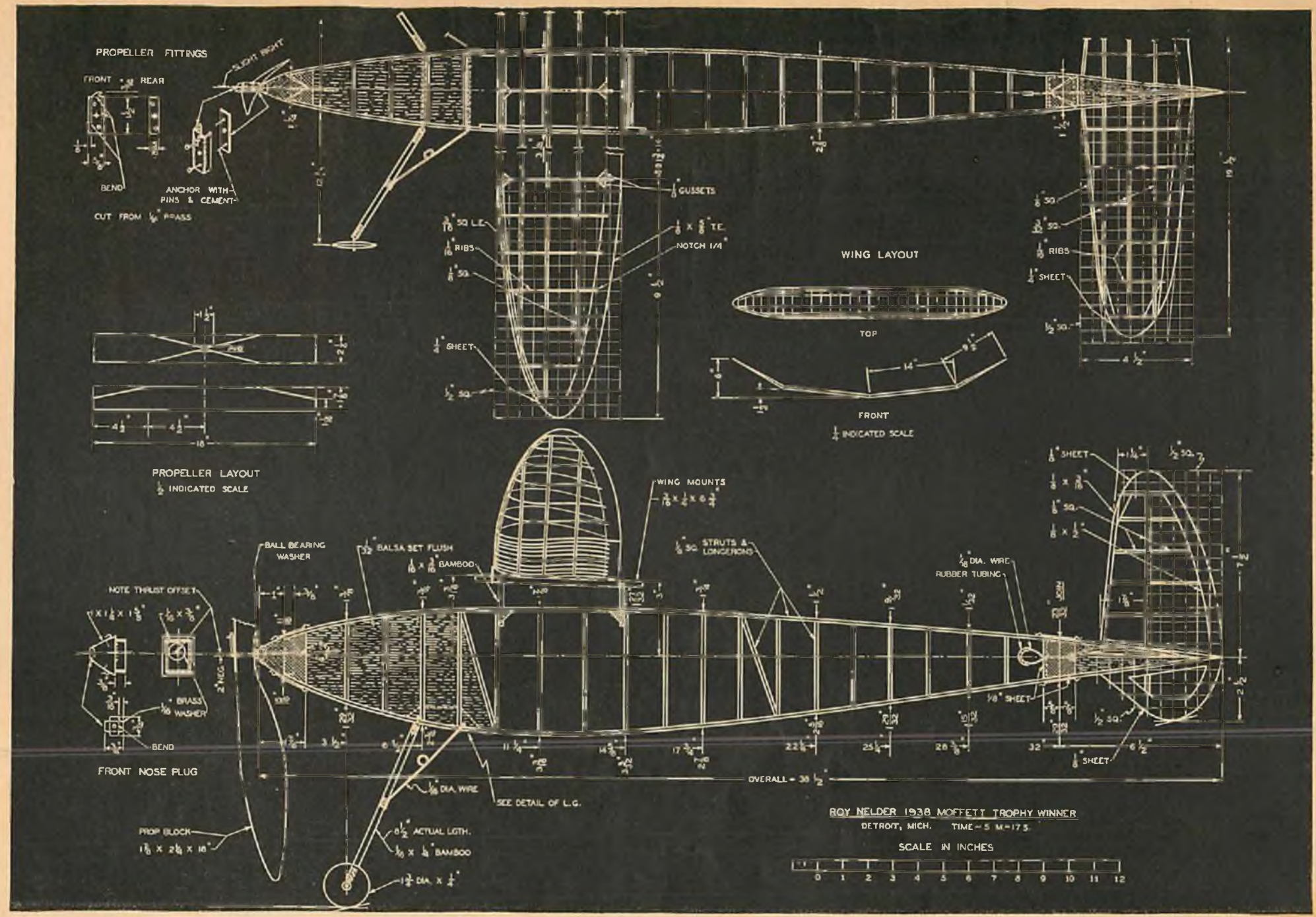
Flying conditions in Toronto and the surrounding parts of Canada are quite different from those which the Canadian entrants encounter during contests in the States. They seldom have calm weather in the early spring—and such weather is necessary for test-hopping the models built for the spring and summer contests. The wind cuts down duration and is responsible for many unnecessary crack-ups. Nelder's Moffett Winner showed no evidence of crack-ups despite extensive test flying and contest work done prior to Detroit. The covering and doping was perfect, without any blemishes. The propeller was doped to a high luster free from nicks and burrs. Close inspection of the model after its winning flight made it seem as if it had just left the workshop. This is a tribute to the construction skill and good flying judgment of Roy Nelder.

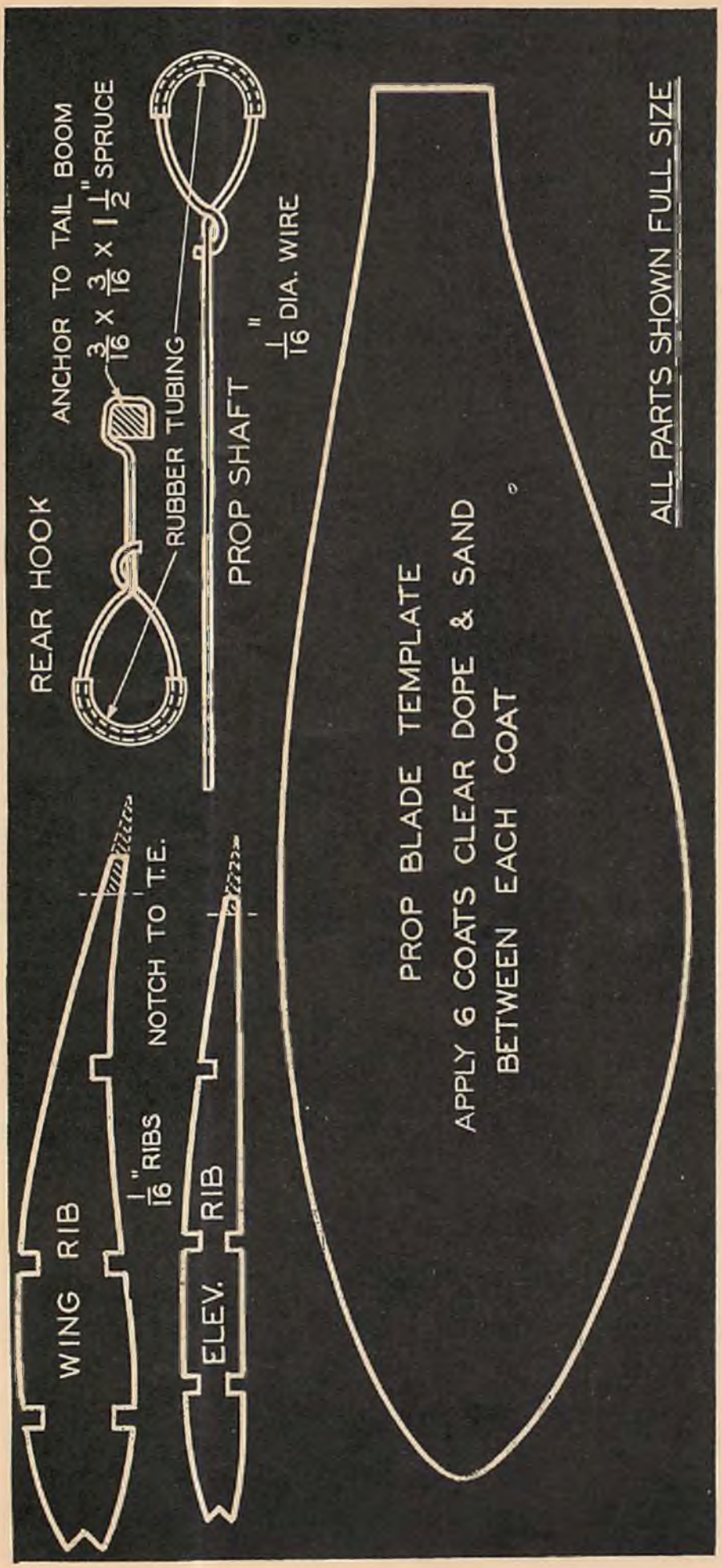
CONSTRUCTION

Fuselage is square-cornered, rectangular cross-section. The ⅛" square longerons and bracing are built into two identical side panels, following the dimensions shown in the side view. These dimensions are referred to the thrust line and the outside edge of the longeron. The front and rear ends of the fuselage are filled in with ⅛" sheet to provide additional strength for the nose and tail plugs.

In joining the two halves of the fuselage, hold the three dimensions indicated in the top view; 1¼" at the nose, 3¼" and 1½" at the rear where the tail boom joins the fuselage. Fill in the cross-bracing to round out the fuselage to a smooth shape.

1/32" sheet balsa is set flush with the edges of the front fuselage. This planking extends back to the first diagonal brace. Before planking the bottom, the


PROPELLER FITTINGS
FRONT
REAR
BEND
ANCHOR WITH PINS & CEMENT
CUT FROM 1/16" BRASS
SLIGHT RIGHT
1/8" GUSSETS
1/8" SQ L.E.
1/16" RIBS
1/8" SQ.
1/4" SHEET
1/2" SQ.
1/8 x 3/8" T.E.
NOTCH 1/4"
WING LAYOUT
TOP
FRONT
1/4 INDICATED SCALE
1/8" SQ.
1/32" SQ.
1/16" RIBS
1/4" SHEET
1/2" SQ.
PROPELLER LAYOUT
1/2 INDICATED SCALE
WING MOUNTS
1/8 x 1/2 x 6 3/4"
BALL BEARING WASHER
1/32" BALSA SET FLUSH
1/16 x 3/16" BAMBOO
1/8" SQ. STRUTS & LONGERONS
1/8" DIA. WIRE RUBBER TUBING
1/8" SHEET
1/2" SQ.
NOTE THRUST OFFSET
BRASS 1/16 WASHER
BEND
FRONT NOSE PLUG
1/16 DIA. WIRE
SEE DETAIL OF L.G.
PROP BLOCK 1 1/8 x 2 1/8 x 16"
6 1/2" ACTUAL LGTH. 1/8 x 1/4" BAMBOO
1 1/2" DIA. x 1/4"
OVERALL = 38 1/2"
ROY NELDER 1938 MOFFETT TROPHY WINNER
DETROIT, MICH. TIME-5 M-17.5
SCALE IN INCHES
0 1 2 3 4 5 6 7 8 9 10 11 12



landing gear should be added. The fuselage should be strengthened at the landing gear location by two ⅛" balsa gussets set inside the fuselage and cemented to the 1/32" planking and the longerons. Two lengths of 1/16" inside diameter brass tubing are inserted through the fuselage—the edges trimmed off flush with the outside of the fuselage. Extend a piece of wire through the front tubing and bend the ends to form an inverted U shape. The legs of the U are cemented and threaded to the 1/16 x ¼ x 8½" bamboo landing gear struts. These struts are braced at their mid-point by two short lengths of wire cemented and threaded to the struts, and their ends inserted in the rear brass tubing. The wheels are two cross-grained thicknesses of ⅛" lined with brass tubing axle bearings. The rear wire struts can be pulled out of the tubing and the landing gear folded up alongside the fuselage to facilitate carrying and packing the model.

Roy Nelder, the ship and the trophy.

Tail boom is built up from ⅛" square filled in with 3/32" sheet balsa. It attaches to the fuselage in the same manner as the nose plug. That is, the plug is built up from 1/16 x ⅜" sheet balsa. The rear hook is anchored to a piece of 3/16 x 3/16" spruce set in the tail boom. 1/32" diameter wire hooks are cemented to the boom and the rear of the fuselage. These hooks are joined with rubber bands on the top and bottom.

Nose plug is clearly illustrated. Fit a $^1/_{16}$" brass plate over the front of the plug to serve as a propeller bearing. A similar plate is secured to the rear of the nose plug to hold the propeller shaft at the correct angle: 2 degrees negative with slightly less right thrust. Rubber and hooks are used to secure the nose plug in the same manner as the tail boom.

Wing Mounts are balsa $^3/_{16} \times \frac{1}{4} \times 6\frac{3}{4}$" attached to the fuselage by bamboo uprights $^1/_{16} \times ^3/_{16}$". The ends of the bamboo are inserted halfway through the balsa pieces. The other ends fit along the longerons. Corner gussets of $\frac{1}{8}$" balsa are added between the longeron and the fuselage bracing to provide better cementing surface. The balsa wing mounts are joined by cross-braces of bamboo $^1/_{16} \times ^3/_{16} \times 3$". The ends of the bamboo are inserted and cemented to the balsa. The angle of the wing mount shown in the drawing is the correct one. Duplication of this angle in your model will permit using the wing flat atop the wing mount without the trouble of balsa incidence blocks.

Wing is built in four pieces and joined to the correct dihedral just before covering. The two center portions are uniform chord (5"). The two outboard panels are tapered and the shape can be readily duplicated by laying out half-inch squares and plotting the outline. Nineteen full-size ribs and ten shortened ribs are required. Ribs are notched $\frac{1}{4}$" into the trailing edge.

When joining the four pieces of the wing, notice the $\frac{1}{8}$" balsa gussets placed between the end rib and the leading and trailing edges of each of the four sections.

Elevator is built in one piece and after covering is inserted through the tail boom. Cut away the $^3/_{32}$" sheet balsa covering in the tail boom to receive the elevator. The correct angle for the elevator is the one shown in the drawing—that is, the flat under-surface should be directly in line with the thrust or reference line. A few drops of cement between the elevator and the tail boom will hold it in position. A tissue fillet is used to smooth out the junction between the elevator and the tail boom.

Rudder is built directly to the top of the tail boom. The ribs are $\frac{1}{8} \times \frac{1}{8}$" balsa. The bottom portion of the rudder is cemented to the bottom of the boom. The shape of both these portions of the rudder can be made full size for easy working by laying out the points on $\frac{1}{2}$" squared paper. The rudder is offset $\frac{1}{8}$" to the right. If the first flights show further rudder adjustment is necessary, it can be readily warped.

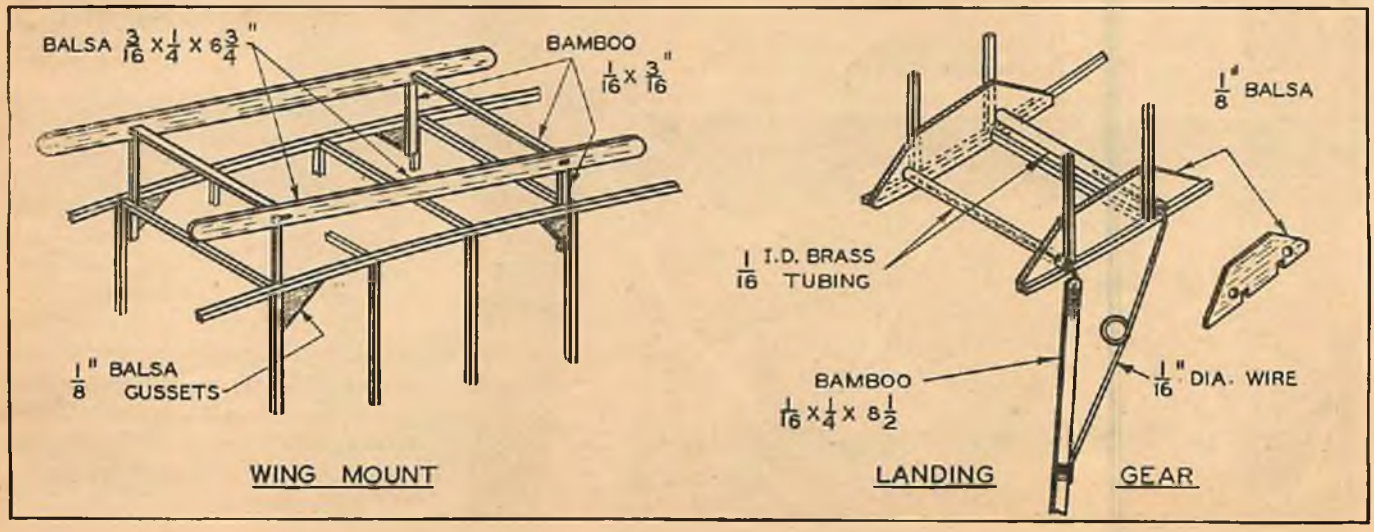
Propeller is carved from a block $1\frac{7}{8} \times 2\frac{1}{4} \times 18$". A full-size blade pattern is included with the article. At the mid-point of each blade the rear face of the propeller should be cambered to a depth of about $^3/_{16}$". The propeller should be doped, sanded, and polished to a high luster. The front and rear of the propeller hub are fitted with guards of $^1/_{16}$" sheet brass. The front fitting is flanged outward to engage the propeller shaft for free-wheeling action. The flange is cut so it engages the shaft in only one direction when it is driving the propeller. It is free to slip over the flange when the propeller is spinning free. The front and rear fittings are cemented and anchored to the propeller with short pins inserted through holes punched in the brass. A ball-bearing washer is used between the propeller and nosing. *(Turn to page 89)*

ABOUT THE AUTHOR

Four years ago Roy Nelder started in the model hobby building scale models. It was only a short time until outdoor contest models were included in his model work. In the spring of 1937 his contest work began to show results when he won second in the Moffett elimination conducted by Eaton's of Toronto. Later the same year he lost his entry at the Canadian National Exhibition contest on an unofficial flight of 12 minutes. Unfortunately it was not returned in time for the contest.

The following winter Roy designed and built the model described in this article. His goal was a victory in the Eaton contest. He reached this goal with a first in the Canadian Moffett elimination, and second in the Wakefield eliminations. The prize was a free trip to Detroit for the 1938 National Meet. Here he won the Moffett International Trophy.

Nelder is 17, lives in Toronto, and is a mighty capable modeler. The neatness and painstaking care that usually accompany scale-model construction are clearly evident in Roy's outdoor models. Careful construction of a fundamentally sound design is his way to contest victories. Roy is a pleasant modeler to know—a typical member of the Canadian delegation which has become such an important part of all our national meets. He's always welcome to attend our meets—even though he did carry off one of our most beautiful trophies!



CLUB NOTES AND NEWS OF MODEL ORGANIZATIONS.

model

FREE MODEL TESTING. Roy Marquardt, of Burlington, Iowa, has been conducting exhaustive tunnel tests on models. He has kindly offered to extend facilities for testing to anyone interested in getting accurate data on their particular designs. Tests will be made under his direction free of charge on wing sections or finished models of not over 30" span and 24" length. Testing will be done in the laboratories of the Burlington Junior College. Models will be carefully handled, and if they are of real scientific value, the return postage will be paid. Roy is especially anxious to test original airfoils. Such test sections should be square-tipped, 5 x 20". Indoor sections should be paper-covered with regular-size hard-balsa spars and $\frac{1}{16}$" square ribs. Outdoor sections may be of any construction, but should weigh about .4 ounces. If aspect-ratio tests are desired, send three sections, 16 x 4, 20 x 4, and 24 x 4. Full credit will be given the sender, but the results will be published for all interested.

Send test sections to William Bloom, 107 Starr Avenue, Burlington, Iowa. Correspondence on this matter should be addressed to Roy Marquardt, 1604 Osborn Street, Burlington, Iowa.

CHICAGO AERONUTS. The Chicago Aeronuts held a victory banquet celebrating the club's splendid showing at the National Meet. The guest of honor was Milton Huguelet, who won the title of National Champion. Other 'Nuts to place high were Carl Goldberg, who won the Springfield Trophy, Wally Simmers, second in the Mulvihill, and Joe Matulis, who earned two thirds and a sixth.

While Akron won the trophy for club performance, the Aeronuts were a close second, an especially remarkable performance considering

Warming up! An interesting photo of the motor installation on a Stinson scale-gas job. Note plug-in wires. Below—A record-breaking "diamond" of original design built by James Wilson, Whitefish Bay, Wis.

Wilfred Izzard, Mimico, Ont., built this successful model of Korda's 54-minute job. Plans appeared in the February issue.

matters

FLIGHT RECORDS AND CONTESTANTS IN COMPETITIONS.

that the twenty 'Nuts entered in the meet represented only a portion of the Chicago delegation. Nevertheless, they alone were able to come within a few points of beating the Akron group—which included all the modelers from Akron and vicinity.

The club has decided that too much model building is not so healthy, and the first step toward a better-rounded program was a vacation for club members. The club rented a large cottage on the shore of Lake Michigan and spent a few days there forgetting thrust lines, airfoils, incidence, et cetera.

Fun Frolic was the name given to a contest recently held by the Acronuts. Flying was done in a parking lot. Trophies were awarded for first in all events. No rules was the contest motto. Glider and R. O. G. were the events. No area or weight rules. The boys flew anything that had wings and had a better time than the routine contest offers. In the R. O. G. event a .24-ounce model of the Curtiss Robin placed high against a 5.3-ounce fuselage job. This type of contest is plenty of fun, and other clubs are advised to try it as pleasant change from the usual meet.

NORTHERN INDIANA CLUB. Dr. A. L. Evans was recently elected president of the newly organized Northern Indiana Gas Model Association. Other officers are: Clarence F. Magee, vice president; Benjamin Magee, secretary; Horace King, treasurer; and Bob Roberts, senior adviser and contest director. Headquarters of the club have been established at 4490 Broadway in Gary, Indiana. Meetings are held every other Thursday night. Club meets will be held every Sunday.

Gary recently conducted an invitation meet that attracted modelers from all parts of Indiana and Illinois. It was voted the best planned and most smoothly operated meet held in a long time. Information about the club's activities can be obtained from Bob Roberts at the club headquarters at the above address.

Joe Walsh, New Bedford, Mass., holding his 53" contest model, a 205-sq.-in. job powered by 20 strands of 3/16" flat rubber.

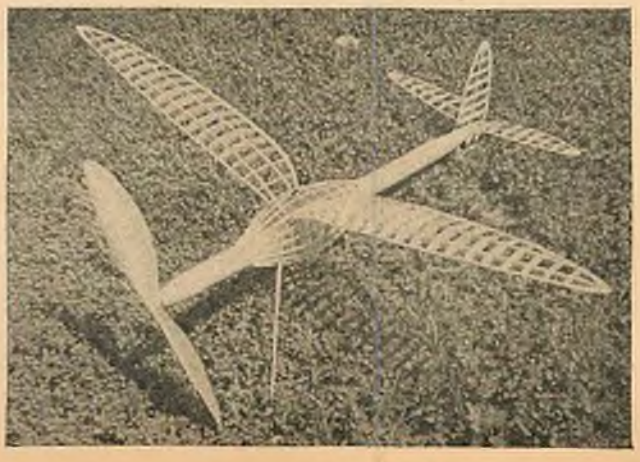
Lower, left—A line-up of gas models in beauty event at Staten Island meet. White job by Joe Raspante was winner.

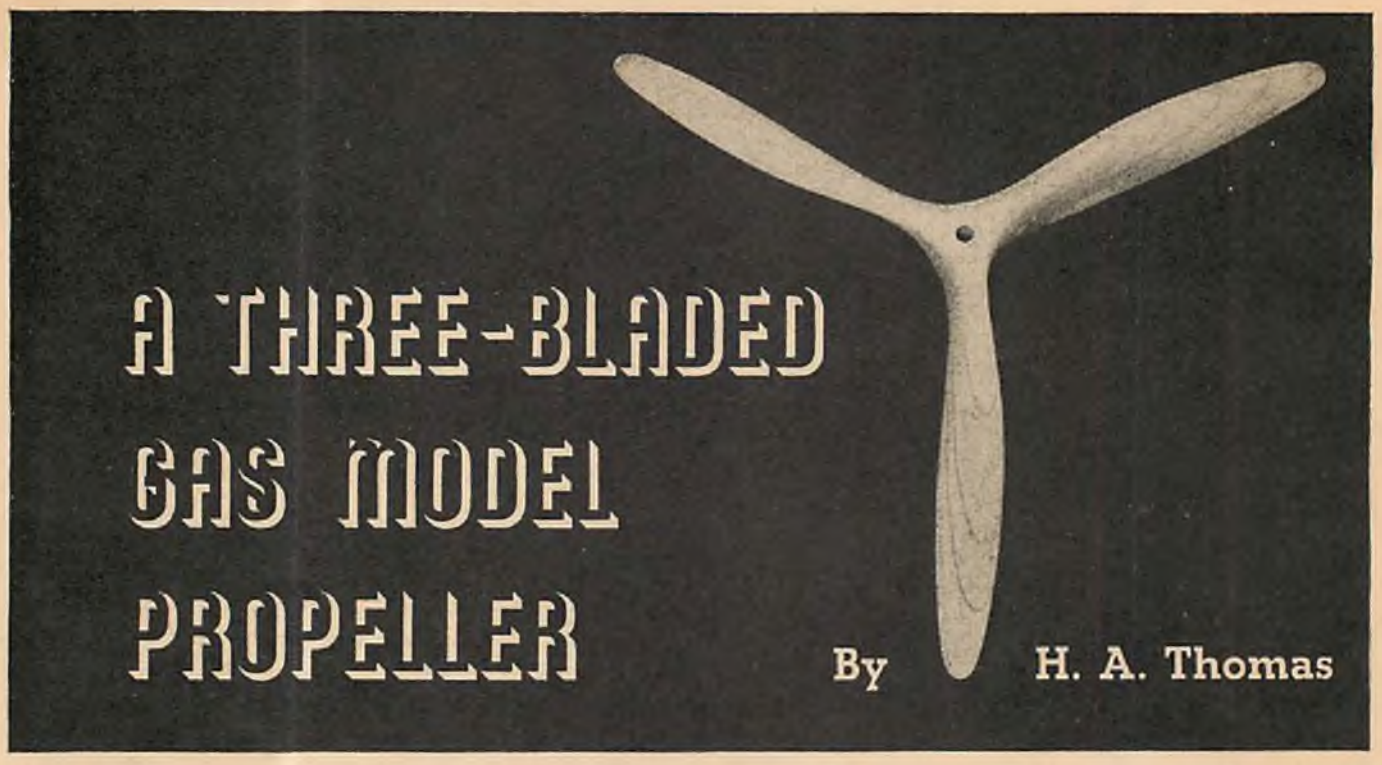
Lower, right—A novel Wakefield design by Ed Sengwods, Brandon, Man. Fuselage is stick; pod for required cross-section.

NEWS AND NOTES. *Model Air-Lines* is the name of the official publication of the Kiwanis Model Airplane Club of Morgantown, West Virginia. It is a tabloid-size four-page newspaper, complete with photos, articles, and current news. Christie Batlas is the editor. This is one of the most attractive club publications that has yet appeared. Those interested in learning more about model activities in West Virginia and in receiving a copy of the club publication, address Editor, P. O. Box 160, Model Air-Lines, Kiwanis Model Airplane Club, Morgantown, West Virginia.

* * *

Frank Griffith, Jr., is a modeler who is employed in his father's office in Fort Dodge, Iowa. Since his father is a designing architect, there is wealth of material in his office which is readily adaptable to model construction. Most of this is available in sample quantities —which is sufficient, *(Turn to page 97)*





A THREE-BLADED GAS MODEL PROPELLER

By H. A. Thomas

Diameter is smaller, flywheel action greater, and, because of through-ply rotation, the propeller hub is nearly unbreakable.

A neat propeller design that has a practical application and that has proven itself to be foolproof.

This article will describe a method of constructing a three-blade propeller that is radically different from other methods, but one which has been found to be entirely practicable. The idea was conceived by the author several years ago and was first applied successfully to rubber-powered models. More recent experiments developed a gas-model version which possessed two distinct advantages over two-blade propellers: a smaller propeller diameter, making possible shorter landing gear, and a greatly improved flywheel action.

The most suitable materials are mahogany, walnut, poplar, and maple. Care should be used in selecting well-seasoned, straight-grained wood. The dimensions given are for a propeller suitable to any one-fifth h.p. engine. There are six laminations of three-thirty-secondth-inch thickness in this propeller, and each lamination is composed of three parts—one "through" member and two butt-joined members. Refer to the drawing for details.

In gluing up the block a glue press is desirable, but if one is not available numerous C clamps may be used. As to the glue, casein or hot glue will do, but in either case it should be applied according to directions.

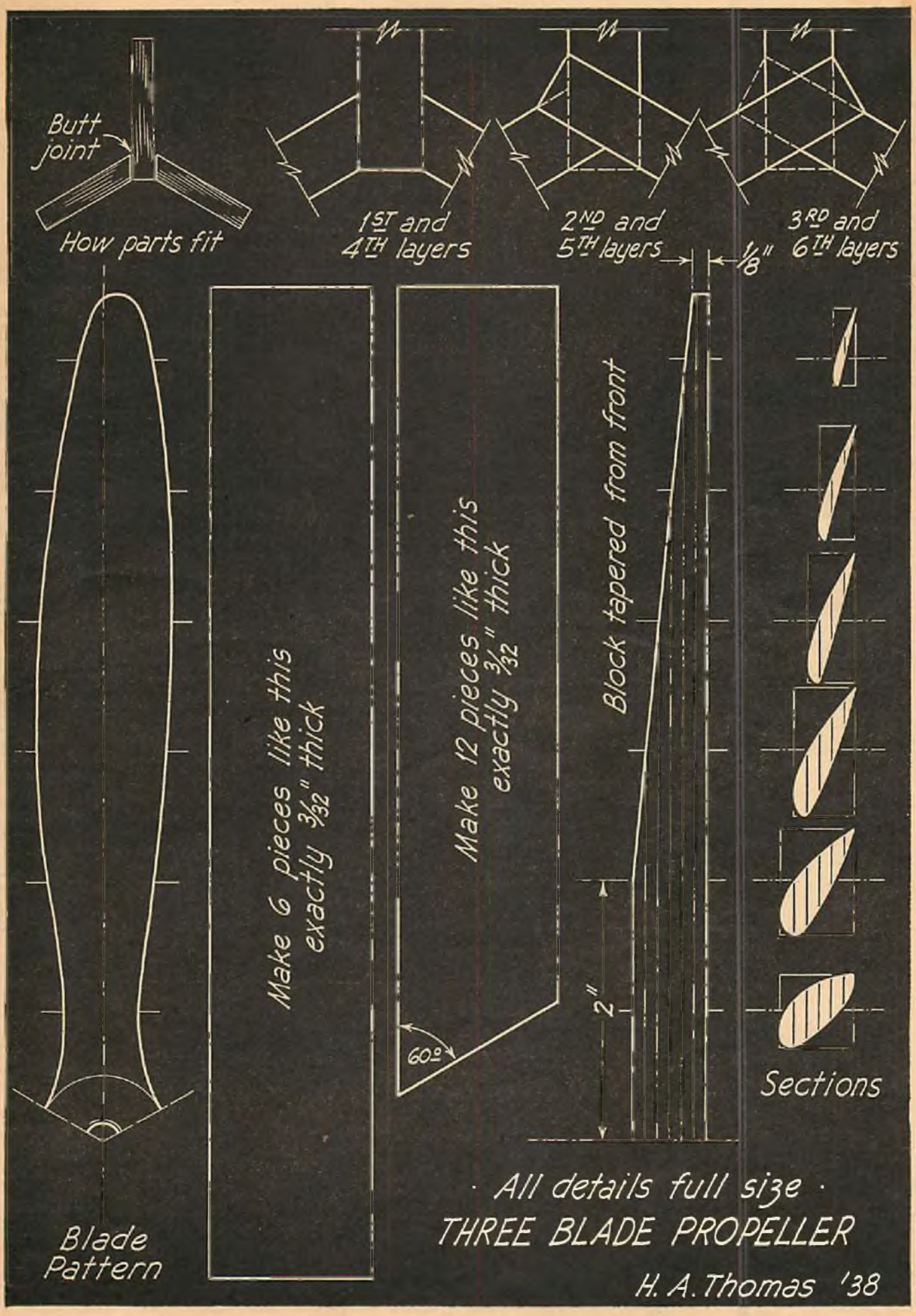
When all parts are ready and the glue is prepared, the first lamination is laid upon a flat surface and glue applied to the butt joints. The entire upper surface of the lamination is then given a liberal coating of glue and the parts of the second lamination laid down upon it with the "through" member turned one hundred and twenty degrees from that of the first layer. Each layer or lamination is applied in the same manner with the "through" member revolved one-third revolution from that of the preceding one. This provides two "through" members per blade. The block is then placed under pressure by the glue press or clamps.

After the glue has thoroughly dried, the block may be removed from the press. The faces of the block may be lightly sanded, the center lines established, and the blade pattern traced on each blade. The shaft hole may next be drilled and the blades band-sawed to shape. Next the taper should be marked on each blade and carefully cut with a plane. The blades are next carved with a draw knife and rasp. Balancing the blades is a little difficult and should be done as nearly as possible by sanding the heavier blades. If the propeller still fails to balance, additional finish may be applied to the lighter blades.

Finish the propeller with several coats of clear dope, sanding lightly between coats, and finally with several coats of clear lacquer.

An additional step in the way of ornamentation may be taken by metal-tipping the blades. First, the portion to be tipped is marked and a piece of thin tinfoil is cemented in place. The outer surface of the tinfoil is then cleaned with acetone and the tips nickel-plated, separately.

It the plans are carefully followed, the finished product will reflect the extra time required by its appearance and strength.


Butt joint
How parts fit
1ST and 4TH layers
2ND and 5TH layers
3RD and 6TH layers
1/8"
Make 6 pieces like this exactly 3/32" thick
Make 12 pieces like this exactly 3/32" thick
Block tapered from front
2"
60°
Sections
Blade Pattern
· All details full size ·
THREE BLADE PROPELLER
H. A. Thomas '38

UP AND DOWN

(Continued from page 24)

then to Wichita, and still have a hundred gallons left, I mentally figure.)

All we do now is to wait until the passengers and cargo are loaded, which will take about four minutes more. This time goes quickly, and now the plane is loaded and a mechanic signals: "Is the pressure up in the landing gear?" After checking the gauge, I find it shows 600 pounds and signal back that it is. The mechanic then removes the safety pins. "Clear on both," the mechanic replies, meaning that it is O. K. to start both motors now.

I prime the right motor, close the mixture control, turn on the engine switch, pull down on the starter switch and booster switch, and throw the selector switch to the right motor, and it takes. I repeat the same sequence on the left engine and it starts.

I notice the red signal light on the instrument panel goes off, which means the ticket agent has closed the cabin door in the rear. Yes, there he is now, out in front of the end of the wing, giving me a snappy military salute which I return. This tells me that I am now free to go to Chicago.

I release the parking brake, open the throttles slightly and let the plane roll forward several feet before I turn to taxi down to the northeast end of the field to take off southwest. (Remember, the wind was southwest fifteen miles per hour.)

Out at the northeast corner of the field I bring the big plane to a standstill. More check work is necessary to make sure everything is right for take-off. Wells reads off the list and I check and answer.

Wells: "Wing flaps."
Hanson: "Up."
Wells: "De-icers."
Hanson: "Off."
Wells: "Trim tabs."
Hanson: "Set for take-off."
Wells: "Control surfaces."
Hanson: "Free."
Wells: "Automatic pilot."
Hanson: "Pilot and pressure off."
Wells: "Propellers."
Hanson: "Full low pitch."
Wells: "Carburetor air."
Hanson: "Cold." (I note the outside temperature is 96°.)
Wells: "Mixture controls."
Hanson: "Full rich."
Wells: "Engine fuel selector valves."
Hanson: "Both on."
Wells: "Tank fuel selector valve."
Hanson: "On left main." (This is the tank for take-off.)
Wells: "Run up engines."

I run up each engine individually to thirty inches manifold pressure and check revolutions per minute, each switch: oil, carburetor, and head temperatures: oil, gasoline and vacuum pressure gauges; and gyroscopic flight instruments. As all instruments are normal and the engines running smoothly, I answer, "Engines O. K."

Wells: "Directional gyro."

I set it to correspond with the compass and answer, "O. K."

Wells: "Landing gear latch."
Hanson: "Unlocked it."

As I head the plane down the runway, Wells says, "Lock tailwheel."

"It is locked," I reply, opening the throttles slowly. The plane starts to gather momentum.

As the throttles are wide open now, I note the manifold pressure reads 42 inches and the r.p.m. 2200. I ease back on the wheel as the airspeed reads 65 m.p.h. and the plane leaves the ground.

"Up gear," I order.

A few seconds later Wells says, "Gear is up."

I reduce the throttles to 37 inches, bring the propellers to 2000 r.p.m., reduce manifold pressure to 30 inches, and propellers to 1900 r.p.m. Then I adjust the throttles to use 1100 horse power for the climb, and start climbing at 120 m.p.h. After I have a few hundred feet altitude, I gently turn the plane to the left to a heading of 53 degrees, which is the magnetic course on the first leg to Chicago. Wells, in the meantime, has given the time our wheels left the ground to our ground station at Kansas City, as 8:24 AMC.

We are climbing steadily now, to our predetermined altitude of 7000 feet, at 400 feet per minute, at 1900 r.p.m., and 28 inches manifold pressure. As we pass over Excelsior Springs we reach 7000 feet and level off. We then note the outside temperature and set the power according to our flight plan, which is 1100 horse power for cruising.

At 10:16 it is time to start our descent, so we start down at 300 feet per minute. We are now in the vicinity of La Salle, Ill., and have been cleared over Sheridan, Ill., our inner-marker at 5000 feet by Airway Traffic Control.

We reach 5000 feet and hold this altitude until we have passed Sheridan. The time over Sheridan was 10:22, and Wells gives this to our ground station at Chicago. Once more we start going down at 300 feet per minute.

At 10:31 we change frequencies on our transmitter and call WREE, the control tower operator at the Chicago airport, giving our position as Lamont, Ill. WREE comes right back and says, "It is all clear around the field and the wind is west 10 m.p.h., and use the west runway for landing." Wells tells him we will be over the field at 10:37 and that we are now at 2500 feet.

At 10:35 we get the old check list out and do a little more checking to make sure all the controls are in the proper place for landing.

Wells: "Automatic pilot."
Hanson: "Pilot and pressure off."
Wells: "De-icers."
Hanson: "Off."
Wells: "Mixture controls."

I pull them back and reply, "Full rich."

Wells: "Fuel valves."
Hanson: "Left main tank."
Wells: "Seat belt sign."

I place it in the up position and reply, "On."

Everything is in shape for landing now, except the landing gear and wing flaps, which we shall get a trifle later.

"WREE to Hanson, in TWA Flite 10," comes the voice of the control tower operator. "O. K., I see you are over there about three miles southwest of the airport. It is still all clear for your landing and the wind remains the same. An army ship is taxiing out to take off, but I'll hold him on the ground until you get in. Stand by, army, until TWA lands."

Hanson: "O. K." And, "Down gear," I order.

Wells lowers the gear, locks it, checks the pressure, lights and replies, "Gear down and locked, pressure 500 pounds, and green light on."

Hanson: "O. K."

After making my final turn and line-up with the runway for a landing, I order, "Down flaps, three-fourths."

Wells puts them down and replies, "Flaps are down three-fourths."

Hanson: "O. K."

I slowly pull back the throttles and slow the plane down to 85 m.p.h. indicated for my glide. The army plane is at the end of the runway waiting for me to land.

The wheels touch the ground and when we have very nearly stopped rolling, I give Wells the last order on this trip: "Up flaps."

After bringing them up, he replies, "Flaps are up."

"Use the south taxi strip and come up to Gate No. 1," says WREE.

"O. K.," I reply.

We roll up to Gate No. 1 and stop, put on the parking brakes and cut the switches. I look at my watch and it is exactly 10:42 AMC—schedule.

As we get out of the plane a passenger says to Wells, "A very pleasant trip and exactly on schedule."

"Yes," replies Wells. "It was planned that way."

Careful, boy, he may be a Republican.

OF PRIMARY IMPORTANCE

(Continued from page 29)

mary's big training qualities are teaching self-reliance and how to fly "by the seat of your pants." When one has really flown primaries, it's a safe bet that he won't become scared in anything else that flies—and the word "solo" doesn't mean anything to him because *all* his flying has been solo from the first.

For any new group wishing to start but who find themselves in the same predicament that we were at the start, I would say go ahead with the primary. You can't soar with them, but neither will you lose a lot if either club or ship breaks up later on. If your club can prosper through this stage, then start thinking about your utilities and what have you, because by that time you will have learned what it is all about and will know your particular needs. As a result of our success in club formation and activity I have outlined a plan for use by similar groups.

Organizing the Club. Regardless of the type of organization under consideration, the cash item is always a first necessity. It has been our experience that a few really interested persons with sufficient cash are far better than a dozen or so with a little each, because more flying time is provided for everyone concerned. Greater individual investment makes each man more active.

If possible, pick fellows who have been actively engaged with model building, designing, and flying. Those who go out for motorcycles, snow sleds, kyaks, etc., usually make good members. Persons in these categories will naturally show the most interest and make the best members. Genuinely interested workers are the ones who count.

A suitable workshop where repairs can be effected, and at least a well-sheltered place in which to stake the ship down, are two things to be considered. Have a hangar if possible. The method of launching varies with the gliding site. It may be shock cord, a winch device, or an automobile. If the site permits, you will find the auto cheapest and most practical.

Training Process. Every locality has different problems, so that in training members the process most practical will be adapted to the surroundings. Because our only site suitable for glider work is the airport runways, we have adapted our training methods and flying procedure accordingly. In hilly regions, the shock cord or winch tow would be superior. To us the automobile is a prime necessity, and we find 3/8" hemp rope to be the most practical tow line of reasonable price.

With "Gliders and Gliding" by Barnaby as the club text, we require every new man to study it through until he can satisfactorily answer a suitable questionnaire.

Since most days find a fresh breeze blowing at some time, we set the new man at the controls into the wind and let him experiment with them. We then rock the wings, swing the tail from side to side, and hoist it up and down to get his reactions to these movements. This is repeated till he reacts correctly because it is highly important.

A pair of double-disk wagon wheels is best for training because they do not bounce and the club doesn't lose much when they are wrecked. Wing skids are worth their weight in gold. A hundred-foot tow line is best at this stage because the novice is within shouting distance from the tow car.

The average man will require six to twelve ground runs before he is ready to try his first hop. Most beginners are surprised at the sensitivity of the elevators and will cause the glider to jump fifteen or twenty feet the first time they leave *terra firma*. Bouncy or pancake landings can be expected.

We never urge new members, always have an experienced man at the wheel of the tow car and one on the running board. Varying winds mean varying speeds, and to take a new man off the ground too soon is almost sure to cause a crack-up. With advanced work, the latter half of the climb is the period when greatest stresses are imposed upon the wings. Watching the glider and regulating speeds call for close cooperation between both members of the tow car. The remedy for reducing wing loads near the top of the climb is reduction of speed from the tow car during this period.

Altitudes of 800 feet with 1,000-foot tow lines are about the limit with primaries. To exceed this is to invite disaster because the weight and drag of the tow line is terrific. I would place 600 feet altitude with 800 feet of tow line as an acceptable limit.

Figure 8s and 360° turns are about the limit of maneuverability with these machines because of their relative sluggishness on the ailerons. We have flown ours on days far too nasty and boisterous, but it's no fun and takes a real crew to handle matters on the ground.

I'm sure if once a group of enthusiasts does get together enough men and money to start a primary-equipped club, they too will agree with me that while the high-performance sailplanes and utilities are to be considered an eventual goal, the humble vehicle of the beginner in motorless flight is of primary importance.

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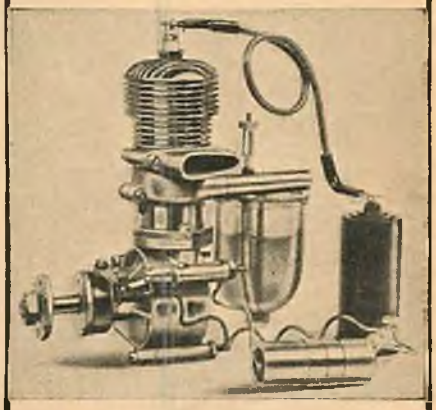

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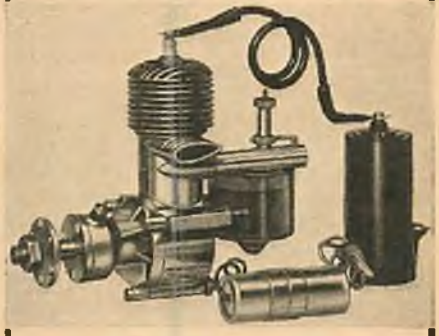

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MEN WANT SPEED

(Continued from page 25)

since 1927. They now are roughly about three times those of rail express. But they depend upon the bulk and weight of the package and the distance to be traveled.

The rate table shows distances divided by "scales" numbered one to twenty-four. The whole thing is very easy to follow. But anyone who dislikes to cudgel his brains with arithmetic will let the expressman do the figuring. Sufficient it is to say that if any package weighs over a pound or measures over four hundred cubic inches in size, then a little attention to weight and girth control can pay dividends.

There are special dispensations to be had. Typical ones apply to packages which must be kept cold. When ice must be inclosed in a package to preserve the contents, then up to a reasonable percentage of the total weight a no-charge allowance is made for the weight of that ice. And for a slight charge the expressman will re-ice any package at a transfer point.

Such services add to the kinds of things which can be air-expressed. And many shipments need it. Grass or ti lily skirts, shipped from Hawaii, must be kept cold until they reach their Broadway hot mammas. Oysters, air-expressed five thousand miles from Baltimore to Honolulu, were put into one-quart jars, which in turn were packed in ice in a five-gallon can, the whole being wrapped in paper which acted as an insulator. And lobsters, air-expressed from Maine to Rudy Vallee, were packed in a watertight barrel with sawdust to catch the excess moisture, and were re-iced en route at transfer points.

The personnel of the transportation companies sometimes stretch the rules a bit to perform extra services. Canary birds and dogs have been air-expressed in the personal care of plane hostesses, although livestock carrying is contrary to regulations. An expressman drove his personal car sixty miles to an airport at his own expense just to make sure that an unusual shipment was properly handled in being transferred from plane to plane.

But special services are needed only by a tiny percentage of the shipments handled. Air express is big business—too big to be run any way except smoothly. And it is getting bigger.

Statistics are boring. However, the use of a few of them can give a clear picture. So draw a deep breath.

Each day there are over five hundred express-carrying planes flying a total of over two hundred thousand miles in the United States. Regularly organized air-express service is now about eleven years old. Since 1932, every year has seen an increase in the tonnage flown, in spite of the ups and downs of the other carriers. The 1937 total of nearly six hundred and twenty-five thousand individual shipments was over thirty times the 1932 tonnage. And at this writing there is the unusual business situation of 1938 being ahead of 1937.

In addition, express-carrying planes go directly from the United States to a hundred and fifty cities in Mexico, West Indies, Central America, South America, Hawaii and the Orient. Pan American alone hauled thirty-nine thousand separate shipments from Florida to South America last year, or over eighty times the corresponding tonnage of 1936.

The length of the average domestic air-express haul has increased to eight hundred and forty-eight miles from the 1936 average of seven hundred and sixty-three miles. The air-express revenue, however, has not gained proportionately, for shippers have become clever enough to reduce the average weight per package from the old 8.25 lbs. down to 6.88 lbs. Wise packaging has made a large part of the difference.

Packaging for air express often is ingenious. Pumpkin pies, for example, when shipped by rail forty miles to Minneapolis and then a thousand miles by air to Newark, were packed on a flat chemical heater which kept them piping hot from oven to delivery. Wax master records for broadcasting station electrical transcriptions, are shipped in the same familiar type of silk-lined padded cases which are in everyday use for jewelry and musical instruments. X-ray tubes and other fragile articles are suspended on canvas or rubber slings inside their boxes.

Perhaps the most ingenious packaging is that of flowers for air express. One of its tricks is to use freezing to protect them from being frozen. That sounds silly, but it works. The explanation is that when water freezes it gives off heat—about a hundred and forty-four British thermal units for each pound of water frozen. To take advantage of this heat, the flowers are wrapped in several thicknesses of wet newspaper, then in waterproof material to protect the rest of the plane's cargo, and finally in insulating paper. As the wet newspaper freezes, it gives off its so-called "latent heat of fusion," and since this heat cannot escape outward through the insulation, it must flow inward to keep the flowers warm.

Packages so protected have kept their flowers from freezing for over forty hours when the temperatures outside them were fifteen degrees Fahrenheit and below. And the thicker the wet newspaper, the longer the flowers keep warm.

In packing for summer air express, the stems of flowers can be inserted in test tubes full of water, leakage being prevented by rubber gaskets. With leaves and blossoms protected by stiff but transparent coverings, those flowers then make long air journeys and arrive fresh and beautiful.

Business after business is developing packaging techniques which will cut down weight and bulk for air express. Clothing, cosmetics, canceled bank checks, construction—it seems impossible to name an industry which is not benefiting by air-express speed. And that this new packaging technique will benefit all forms of transportation is just a bonus which air express is giving to the whole world of commerce.

Packaging techniques are building air express. And so are the new planes, with their air-conditioning to cut down temperature-control problems, their bigger cargo space to reduce costs, and their higher speeds.

And every time a new airport express terminal is opened, air express takes another climbing turn. Just lately new air-express ports have been opened at Norfolk, Va., Akron, O., Sault Ste. Marie, Mich., Flint, Mich., and Grand Rapids, Mich. Every opening meant that chambers of commerce and other civic bodies had worked for months or even years with the government at Washington and with local authorities. No wonder there were hilarious celebrations. No wonder the first planes to land brought gifts of flowers and foods from well-wishers all over the land.

Air express is a great help to sentiment. A son sends his traveling mother a rose from her own garden, and it arrives with the dew still fresh on it. A mother sends her college son a cake with oven freshness unstaled when he gets it. And a young man sends his girl friend candy of the delicate flavoring which would not survive five hundred miles of any slower travel. But, then, true sentiment is always impatient.

The great bulk of air-express matter does not depend upon sentiment. It is strictly business.

For the planes give express that one thing it wants, speed with gentle motion and safety. Speed alone is not enough—if it were they would be firing express-loaded projectiles out of cannons. The planes are fast but gentle.

On its part, air express brings to aviation a steady income and an increasing one. It is a natural wedding—gentle speed on one side, bread and butter on the other, and the whole world of commerce performing the ceremony.

GLIDING AND SOARING

(Continued from page 33)

consistently good flights to share proportionately in the points award.

The American Business Club Trophy for Midwest Soaring Champion again went to Elmer Zook, who won it in 1937. Elmer's best altitude, best distance and best duration placed him only slightly ahead of Warren Merboth and Stan Corcoran.

The Detroit Times Group Trophy for most active use of one ship by a group of two or more pilots was won by the XYZ Soaring Club with their Hawk.

From the standpoint of technical development of soaring in west Michigan, several important advances were made. Most important was Peter Riedel's thermal flight in his Kranich, in which he cloud-hopped over the town of Franklin at eighteen hundred feet altitude on small puffs of cloud coming in off the lake. In his hour and a half of soaring he definitely demonstrated the possibilities of cloud-hopping distance flights down the lake, without the aid of slope winds from the dunes. He came down because he was hungry, and not due to lack of thermals.

Another technical advance was that of consistently successful use of wire and winch launching. Winch launching along the beaches has several advantages over auto towing. Most important, of course, is that it saves the tow cars. Instead of having to drive thirty-five to forty miles per hour, the tow cars are now used only at very low speeds, merely for retrieving the wire, handling equipment, et cetera. Another advantage is in keeping the wire out of the trees, for the winch can reel the wire in very rapidly after release, thus saving no end of trouble in retrieving. Wire must be used for towing on the beach because rope gets water-soaked and buries itself in the sand, making its use doubly undesirable. Winch launching will, without a doubt, be standard practice for practically all future beach launching.

Closely allied with the use of the winch was the demonstration that fair-sized contests could be easily handled at Frankfort.

As to the dependability of the site for a slope-soaring contest, the six days of slope-soaring weather out of the ten days of the meet merely confirms averages of the preceding three years of experience. The fact is also further established that an active group, during a nine or ten-day fall contest at this site, can put in approximately twenty hours of soaring, qualify all the new "C's" they have, and besides that get in at least one five-hour duration leg on a Silver "C."

Socially, the contest was also very successful. The group was not so large that most pilots didn't get to know each other. Of invaluable help here was the overwhelming hospitality of the city of Frankfort.

Plans are already under way for the 1939 Frankfort meet.

NEWS AND EVENTS

The Associated Glider Clubs of New Jersey held their annual soaring contest at Schley Glider Field, Liberty Corners, N. J. Seven ships and ten pilots participated. The events consisted of spot landings, bomb dropping and endurance flights. Floyd Sweet, flying his Rhonbuzzard, made a goal flight of twenty-five miles. Stanley Hruslinski in the Y Glider Club's Kestrel sailplane reached the best altitude, thirty-two hundred feet, as well as won the endurance prize by staying up three hours and twenty-four minutes. The second prize went to Herbert Sargent flying the Schweizer all-metal utility. Gus Scheurer, originator of this yearly event, flew his Franklin.

Stan Corcoran has purchased Felix Chardon's Franklin and is taking it to Frankfort, Mich., where he is opening a glider school. Meantime Felix is going ahead with the construction of his high-performance sailplane, which will probably be ready in time for next year's Elmira contest. Carlton Schaube is also busy building a two-place sailplane.

From Lew Barringer comes word that Harland Ross, designer of the Ross sailplane, achieved recently an astounding altitude of seven thousand four hundred feet out in Wichita Falls, Texas, after releasing himself from winch tow at four hundred feet. This flight, which unofficially exceeded the present altitude record, was made in a converted secondary glider, the Pruefling.

The British National Contest this year was won by C. Nicholson flying a Rhonsperber. Second prize went to P. M. Watt in a British sailplane, the King Kite, and third to J. S. Fox, who flew a Rhonadler.

A world duration record for two-place sailplanes was claimed by two Austrian sailplane pilots, Kahlbacher and Fuehringer, who remained in the air for forty hours, fifty-one minutes.

The Russians did it again. Recently Master Sailplane Pilot Kartasheff, carrying a passenger, broke the world distance record for multi-place sailplanes when he flew a distance of four hundred miles from Moscow to Tchernigoff.

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QUESTIONS

(Continued from page 38)

Question: I am just finishing a course in auto and Diesel motors. I would like to know if there is any place where I could get an apprentice's job as an aviator or mechanic. E. B., Nashville, Tenn.

Answer: I understand that the State of Tennessee has quite an aviation program to help those who want to get into it. Write to Maj. Walter Williams, Director of Aviation, Nashville, Tenn.

Question: Will you please give me a list of schools which offer aeronautical engineering. At which kind of schools is one more able to get a job? I have been checking airplane designing and practical aerodynamics at the library but I find it a little too advanced for me. Do you know where I could get a simple book on aerodynamics? R. B., Dallas, Texas.

Answer: See our September issue, which carries a list of aeronautical schools. Try the book called "Simple Aerodynamics" by C. C. Carter, or "Principles of Aerodynamics" by Max M. Munk, both published by the Ronald Press, 15 East 26th St., New York City.

Question: What is the height of American airliners? What is the weight and top speed of a P-12 F? R. B., Mission, Texas.

Answer: The height of a Douglas transport is 16 feet, 3 inches. The top speed of a Boeing P-12 F is 180 m.p.h., and weight empty 2000 pounds.

Question: Could you inform me where I may obtain some photographs of the Navy Curtiss SOC-1, 3 or 4? Could you also inform me where I may obtain some photographs or drawings of the insignia of the Navy observation squads 1, 2, 3 and 4 stationed aboard the battleship? W. H. T., Bremerton, Wash.

Answer: For photographs of the Curtiss SOC-1, 3 and 4 write to Rudy Arnold Photos, Floyd Bennett Field, Brooklyn, N. Y. They cost a dime each. For the insignia write to the Publicity Bureau, Naval Dept., Washington, D. C.

Question: In looking for a suitable school in which to take up metal aircraft construction, I have seen several ads where schools actually give employment to their graduates. Would you advise taking up this work as a career? J. R. T., Mt. Pocono, Pa.

Answer: A number of schools do give employment to their most promising graduates, and even find work for them with aircraft manufacturers. I certainly think that metal aircraft construction would be an excellent career, as more and more metal airplanes are being built.

Question: What make of airplane did Clark Gable fly in winning the Thompson Race in the movie "Test Pilot"? Can the performance of an aero engine be improved by using a small type carburetor on each cylinder instead of one large one? Is this practical with a supercharger? Has this system ever been used? Which of the three theories, partial vacuum along the wing, Prandtl circulation flow, and the induced lift, is the most popular and correct? Using the most popular airfoil lift theory, explain how inverted flight is accomplished by a non-symmetrical airfoil. R. P., Forney, Tex.

Answer: The ship used by Clark Gable to win the Thompson Trophy race in "Test Pilot" was the Marcoux-Bromberg racing plane which was flown by Earl Ortman in last year's National Air Races. A system similar to the one described by you and called the injection system has been used by the Continental Motors and Pratt & Whitney, but because of complication in adjusting the carburetion it is still in experimental stage. Induced lift is the most popular theory of lift used. Your last question will take up too much space to answer. However, if you have ever seen an airplane flown inverted you would notice that it is flown with the nose high so as to present a higher angle of attack of wing and get a greater lift from the underside of the wing.

Question: Are there any positions in aviation such as supply room attendants? If so, how are these positions secured and what qualifications are necessary? M. G., Camden, Ark.

Answer: You mean stock room clerks. You have to be familiar with aircraft materials, tools and supplies to obtain these positions. If you are, write to the different aircraft manufacturers and operators, stating your experience, and they will send application blanks for you to fill out and return.

Question: Will you please send me the addresses of every company in America which manufactures and sells aero engines from 25 to 100 h.p.? I. B., Larder Lake, Ont.

Answer: The lowest-powered aero engine in America which has an A.T.C. is of 40 h.p. As there are quite a number of engines between 40 and 100 h.p. manufactured, space does not permit listing them all. I suggest that you write to the Aeronautical Chamber of Commerce, 30 Rockefeller Plaza, N. Y. C., for the information.

Question: Will you please tell me how a wheel control differs from the stick type? In other words, on a wheel control what operates the elevator, ailerons and rudder? R. F., Osawatomie, Kan.

Answer: The turning of the wheel to the right or left operates the ailerons in the same manner as moving the conventional stick control. The wheel is located on a control column which moves forward and back and operates the elevators. The rudder is operated by foot pedals the same as an airplane fitted with a stick.

Question: Where can I get technical information on the Autogyro? Is there a book on it? Where can I obtain technical information on cylindrical wings or rotor planes? R. E. J., Cleveland, O.

Answer: I suggest that you write to the National Advisory Committee on Aeronautics, which publishes technical data on different types of airfoils and their uses. The address is Washington, D. C.

Question: Can you tell me how old you have to be to get a pilot's license? Also, can you tell me approximately the number of airplanes in the army and navy? Would you be able to tell me what the smallest practical plane in the U. S. is, and who are its builders? P. P., Goffstown, N. H.

Answer: The minimum age requirement for a private pilot's license is sixteen years, and for commercial eighteen. There are over 2500 airplanes in the U. S. army and navy; about 1200 in the army and close to 1500 in the navy. There are several excellent light planes manufactured at present, and among them are the Aeronca, built by the Aeronautical Corp. of America, Lunken Airport, Cincinnati, O.; the Piper Cub, Piper Aircraft Corp., Lockhaven, Pa.; the Taylorcraft, Taylor-Young Airplane Co., Alliance, O., et cetera.

Question: What is the price of a Kinner Envoy? What is the age of an army cadet? B. B., Tempe, Ariz.

Answer: I do not know the price of the Kinner Envoy, as they aren't manufactured any longer. The age of an army cadet is between twenty and twenty-six.

Question: Are there any schools for women? If so, tell me the qualifications and age necessary to enter. Are there any near New York City? F. W., Mount Vernon, N. Y.

Answer: There aren't any aviation schools that specialize in training women. Any aviation school accepts women students. No special qualifications are necessary to enter providing you are over sixteen years of age. In our September issue we published a list of schools with detailed information as to courses they offer and prices.

Question: I am a fifteen-year-old girl who is determined to be a commercial or transport pilot. Which is it easier for a girl to be? Do I have to have any college education to go to an aviation school? If so, how many years? How many years of aviation training do I have to take to become a good commercial pilot? What aviation school is nearest to a small town in northern Minnesota? L. M., Mahnomen, Minn.

Answer: Commercial and transport rating is the same thing unless you mean limited commercial, which requires sixty hours of solo instead of the 200 necessary for commercial or transport. No college education is needed to gain any of these licenses; you simply have to be able to read and write English. The amount of time you spend in training depends entirely on how quick you can master the art of flying, and how much of your time you can give to it. It usually takes at least two years to pile up the 200 hours required for your commercial rating. The nearest school to you would be at the Wold Chamberlain Airport Minneapolis.

Question: I would like all the information on solo flying that I can get. What chance has a solo pilot in commercial aviation? I would like information on age, amount of education and physical requirements necessary to enter a training school. J. H., Hamilton, O.

Answer: A solo pilot is not permitted to do any commercial flying whatsoever. The solo pilot's certificate is issued to him so that he can put in enough solo time to be able to acquire a private or commercial license. The minimum age limit for flight training is sixteen. No special education is required outside of being able to read and write English, and the student has to be in normal physical condition.

Question: I am taking an aircraft welding course at a welding school in Philadelphia. From what I have read and from talking to different people, I have always thought that before I could get employment in an airplane factory, I would need a department of commerce license, but over at the school they say that a license is not required. What I would like to know is do I need a license or certificate before I can go to work? C. R., Camden, N. J.

Answer: Your school is right. You don't need a mechanic's or any other kind of license to work in a factory as a welder. You may, however, have to join a welders' union.

Question: I would like to know if I may become an airplane and engine mechanic with only a grammar-school education and one year of trade school, in which I studied auto mechanics. M. M., Middletown, Conn.

Answer: Your grammar-school education is sufficient to become an aircraft and engine mechanic. However, one year of auto mechanic training cannot be counted. You have to have experience with aircraft engines and a knowledge of airplane structure, rigging, et cetera.

Question: I am twenty years old and very anxious to become an airplane mechanic. Could you tell me of an airport or factory where I could learn that trade and get enough money to pay my board while doing so? Has the navy a school where I could learn mechanics? C. C., Vineland, N. J.

Answer: Write to the Luscombe Airplane Corp., West Trenton, N. J. They hire apprentices. I think the navy has a school where they train men for airplane and engine mechanics. Write to the U. S. navy, bureau of navigation, Washington, D. C.

Question: Could you tell what type of ships are these illustrated on the postcard? A. K., Jr., Elizabeth, N. J.

Answer: The ships on the postcard are Avro Anson bombers of the R. A. F.

Question: I am interested in airplane design and would like to know if there is a book on the market about designing airplanes. L. W., Oakland, Cal.

Answer: Yes, "Airplane Design," by Warren, published by McGraw-Hill Publishing Co., 330 W. 42nd St., N. Y. C.

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3/16x1 ..2 for .19
½x½ ..6 for .25
½x½ ..4 for .25
¼x1 ..3 for .25
⅜x⅜ ..3 for .25
⅜x½ ..3 for .27
½x1 ..1 for .18
1x1 ..1 for .25

SHEET BALSA 36" Lengths
1/16x2 .... [illegible]
3/32x2 .... [illegible]
⅛x2 .... .05
¼x2 .... .09
for 3" stock, double 2" price.

BAMBOO PAPER
24"x36", 1 sheet..... .05

SPECIAL JAP SILK
A strong, light silk imported specially for gas models.
Grade A, 1 yd. .40

CEMENT
4 oz. .18
8 oz. .35
1 pt. .60
Dope, Paper Adhesive, Colored Dope same prices as cement.

HARDWOOD PROPS FOR GAS MODELS
12" or 14" ea. .80
15" or 16" ea. 1.00

SPRING STEEL WIRE
1/16 dia. 5 ft. .12
3/32 dia. 5 ft. .15
⅛ dia. 5 ft. .25

DURALANGLES
½x½ per ft. .15
⅝x⅝ per ft. .22

SPARK PLUGS
Brown Jr. Plugs. A needle point plug for engines. Recommended for balky motors especially. Each .65

CHAMPION PLUGS
Each .65

REGULAR PLUGS and JACKS
Extra small—wt. 1/3 oz. Per set of 4 .25

BRASS ANGLES
½x½ ft. .25

CONDENSERS
Special gas model condensers.
1½" long, 1 for .25
1¼" long, 1 for .25

STREAMLINED ALUM. TUBING
¼x⅛ ft. .15
5/16x5/32 ft. .16
⅜x3/16 ft. .18

SPARK COIL 1.50

GAS FUNNEL with strainer .30

FLIGHT TIMER
50 sec .50
0 sec to 1 min 2.00

DURAL TUBING
¼ dia. ft. .14
5/16 dia. ft. .20

OHLSSON AIR WHEELS
3½" pr. $1.50
4¼" pr. 1.75

M & M AIR WHEELS
3½" pr. 1.50
3½" pr. 2.50
4½" pr. 2.75

MODEL AERONAUTICS YEAR BOOK
This book contains more than 80 detail plans of both gas and rubber powered models
Price $1.00 p.p.

RUBBER POWERED SPECIALS

18" BALSA
1/16x1/16, 100—5c
1/16x⅛ 35—5c
1/16x3/16, 18—5c
3/32x3/32, 30—5c
⅛x⅛ 30—5c
⅛x¼ 10—5c
3/16x3/16 8—5c
¼x¼ 6—5c
¼x½ 3—5c

18" SHEETS
1/64x2 4—10c
1/32x2 8—10c
1/16x2 8—10c
3/32x2 7—10c
⅛x2 6—10c
3/16x2 3—9c
¼x2 3—10c

PROP BLOCKS
½x¾x6 6—5c
⅝x1x8 2—5c
⅝x1¼x10 3c ea.
¾x1½x12 3c ea.

18" PLANKS
1x1 5c; ½x2 6c
1x1¼ 9c; 1x2 10c
1x3 15c; 2x2 18c
2x3 23c; 2x6 39c
[illegible] 40c; 3x6 75c
3" sheets or 36" lengths, double above prices; add 10c for pkge. charge for 36" lengths.

BAMBOO
1/16 sq.x14 35 for 5c
1/16x¼x11 1 doz. for 8c

COLORLESS CEMENT
1 oz. 5c; 2 oz. 9c
4 oz. 16c; 1 pt. 50c
Clear dope, banana oil, thinner, same price as cement.

COLOR'D DOPE
White, yellow, orange, blue, red, green, olive drab, black, silver, gold or gray.
1 oz. 6; 2 oz. 10
4 oz. 19; 1 pt. 65

HIGH GLOSS
1 oz. 9c; 2 oz. 16c
4 oz. for 28c

RUBBER-LUBE

MICRO-FILM

WOOD-FILLER
1 oz. 10 2 oz. 15

TISSUE, AA
All col., doz. 19c
Superfine, white, 1 doz. 15c

BUSHINGS
1/16 — 1 for 1c

WHEELS per pr.
Brch Blsa Celu
½" .01 .03
¾" .02 .04 .05
1" .03 .05 .07
1⅜" .04 .08 .10
1¾" .07 .10 .1[illegible]
3" .15 .15 .30

ALUM. TUBING
1/16, 3/32, ⅛, 1 ft., 7c
3/16, ¼, 1 ft., 10c

PROPELLERS
Balsa Mach Cut / Paulowina
5"— 4c 10c
6"— 5c 15c
7"— 6c 20c
8"— 7c 25c
9"— 8c 30c
10"— 8c 35c
12"—10c 45c
14"—14c
15"—15c 60c

RUBBER
.015, 25 ft., 5c
1/16 sq. 15 ft. 5c
⅛ flat 15 ft. 5c
Skein for 50c
3/16, 10 ft., 5c

WASHERS
1 doz. ⅛ or ¼ 1c

THRUST BEARINGS
Small, 1 doz. 10c
Large, 1 doz. 15c

MOTOR TRADE-IN OFFER—Send your motor or a description of your motor for best appraisal offer.

HEATHE MODEL AIRPLANE CO.
260 (B-12) Troy Ave., Brooklyn, N.Y.

HOW TO ORDER—No orders under 50c. Add 15c to orders under $1.50. 10% to orders over $1.50. Add 20c for 5 ft. lengths.

FREE $1.00 worth of supplies (your choice) with every order for $5 or over. 35c worth of supplies (your choice) with every order for $2.50 to $5.00

Our complete catalog will be sent upon request. It contains a list of all supplies for gas and rubber powered models, and discounts on kits of all the leading manufacturers.

36" Lengths
1/32x1/16 .. 10c
Per 100
1/16x1/16 .. 10c
1/16x⅛ 20c
1/16x3/16 .. 25c
1/16x¼ 27c
3/32x3/32 .. 25c
⅛x⅛ 30c
⅛x3/16 .... 50c
⅛x¼ 55c
⅛x⅜ 65c
3/16x3/16 .. 50c
3/16x¼ 60c
¼x¼ 85c

BALSA SHEETS 36" Lengths
1/64x2, 10 for 14c
1/32x2, 10 for 15c
1/16x2, 10 for 18c
3/32x2, 10 for 21c
⅛x2, 10 for 23c
3/16x2, 10 for 32c
¼x2, 10 for 42c
½x2, 10 for 75c
If 3" widths are desired, double price of 2" widths

BALSA PLANKS 36" Lengths
1x1, each.... 6c
1x1¼, each.. 9c
1x2, each.... 15c
1x3, each.... 20c
1x6, each.... 35c
1½x1½, each 25c
2x2, each.... 25c
2x3, each.... 35c

PROP. BLOCKS Per Dozen
½x¾x5 .... 5c
½x¾x6 .... 6c
⅝x1x7 .... 12c
¾x1x8 .... 16c
¾x1¼x10 .. 25c
1x1½x12 .. 35c
1x1½x15 .. 50c

CLEAR CEMENT
1 oz. bot. dz. 40c
2 oz. bot. dz. 65c
1 pt. 40c 1 qt. 60c
1 gal. 1.75

CLEAR DOPE
1 oz....doz. 38c
2 oz....doz. 60c
1 pt. 35c; 1 qt. 65c
1 gal. each 1.50
Thinner & Banana Oil same price

COL'RED DOPE All Colors
1 oz. bot. dz. 50c
2 oz. bot. dz. 75c

Jap Tissue
White, doz... 12c
Colored, doz. 14c
Silver, doz... 21c

BEST BAMBOO
1/16x¼x15 dz. 8c
1/16sq.x12 gr. 10c

MACHINE CUT PROPS, per doz.
5" . 20c 6" . 21c
7" . 30c 8" . 35c
10" . 45c 12" . 60c

WHEELS, doz.
Birch Bal Cel
½" .05 .09 ..
¾" .06 .11 .24
1" .08 .14 .25
1¼" .10 .19 .35

THR BEARINGS
sm., dz. 6c, gr. .55
lg., dz. 7c, gr. .65

PARA RUBBER 225 ft. skeins
.045 sq...... 30c
1/16 sq..... 33c
⅛ flat...... 40c

½" NOSE PLUGS
1 doz. 5c 100 33c
Large, per doz. 10c per 100 75c

WASHERS
⅛ or ¼, 100 5c

Shafts or Rear Hooks ...doz. 6c

LG. INSIGNIA SHEETS
doz. 36, 100 $1.65

SHEET ALUM.
.002 thick, 5 ft. 35c
.005 thick, 5 ft. 50c
.010 thick, 5 ft. 75c

ALUM. TUBING
1/16 O.D., 5 ft. 28c
3/32 O.D., 5 ft. 30c
⅛ O.D., 5 ft. 30c
¼ O.D., 5 ft. 43c

WIRE, per 100 Ft. Straight Lengths
No. 6........ 18c
No. 8........ 23c
No. 12....... 27c
No. 14....... 30c

BRASS BUSHINGS
1/16 diam. 100 12c
3/32 diam. 100 15c
⅛ diam. 100 18c

SHEET CELLULOID
12½x16, each 19c
6x8, doz..... 65c

ACCESSORIES COWLS
Anti-drag rings, closed N.A.C.A. or open N.A.C.A. cowls.

1"....3 for 18c
1¼"...3 for 19c
1½"...3 for 22c
2½"...3 for 25c
3"....3 for 35c
4".... Each 25c

PURSUIT OR SWIVEL MACHINE GUNS
¾" Pur. 12 10c
1¼" Pur. 12 13c
1¾" Lewis 12 25c
1½" Lewis 12 16c

2-BLADED PROPS
1½"... 6 for 15c
2"..... 6 for 15c
2½"... 6 for 15c
3"..... 6 for 17c
3½"... 3 for 10c
4"..... 3 for 15c
4½"... 3 for 17c

3-BLADED PROPS
1½"... 6 for 15c
2½"... 6 for 17c
3½"... 3 for 11c
4½"... 3 for 20c

DIE-CAST BOMBS
¾"... 12 for 15c
1¼"... 12 for 25c
3"..... 3 for 20c

WING AND TAIL LIGHTS
3 Pcs. to a Set
12" mod., 3 sets 7c
15" mod., 3 sets 10c
24" mod., 3 sets 12c

PAINT BRUSHES
Quill color brushes doz. .05, gross .40
Large brushes doz. .15, gross 1.40
Extra large doz. .25, gross 2.50

ALUMINUM WHEELS
per. doz. per 50
1" .30 .90
1¼" .40 1.25
1¾" .50 1.60

M & M AIR WHEELS (For rubber powered models) per pr.
1¼"-1⅜"-1½"-1⅝" ...... .35
1¾"-2"-2¼"-2½" ...... .45
2⅝"-2¾"-2⅞" .45

Orders Shipped Express Charges Collect. On C.O.D. orders, send 25c with order, balance on delivery. Save C.O.D. charges, send payment with order.

DIAMOND MODEL M'F'G. CO.
260 Troy Ave. Dept. B-12 Brooklyn, N. Y.

PURSUITEER

(Continued from page 55)

depend on the motor you use. The parts are held together with dress snaps.

WING

If you happen to have an old California Chief or California Champion wing around the house, you can use it, as the wings of these ships are nearly the same dimensions as this one, and have the same airfoil section.

First make the box spar, using 1/16" sheet balsa. Cut out the ribs and slip them on the spar, being careful to space them at the proper intervals. Then fit the leading edge into the notches in the fronts of the ribs, and line it up with the spar. This should leave the trailing edges of the ribs all lined up and ready to take the trailing-edge strip. Cement it in place and then put on the aluminum tube tips, binding the joints with thread. Then, setting the rear quarter of the wing side flat on a table, use a piece of coarse sandpaper on a block of wood to taper the trailing strip. A good *sharp* plane, if you have one, would be better, or a knife, if used carefully, will do. Repeat on the leading edge.

ELECTRICAL SYSTEM

The statement that it pays to do a job well is most certainly true in the wiring of a gas model. By far the greater part of all engine trouble comes from a sloppy or incorrectly installed wiring system. There is only one way to wire a gas job, and that is the *right* way. Follow the diagram exactly. It shows every part of the system in its proper place. No details are given for the timer installation because of the great variety of timers on the market. Solder all joints well, braiding the wires together where they join, and covering all the exposed joints with rubber or tire cement when the solder cools. It is surprising to see the number of builders who put in a neat wiring job, only to leave the joints open to leak current.

The battery box is made from a cardboard tube of a size that will take whatever size flashlight batteries you plan to use. If you wish, you may use any of the other batteries now on the market for gas jobs. The battery box is held in by rubber bands passing over hooks cemented at intervals along the lower longerons from the cockpit to the front bulkhead. A telephone or radio jack and plug is used for the booster connection.

COVERING AND DOPING

The entire ship, even the wooden tail, is covered with silk. Cover each side and the bottom of the fuselage with one piece of silk, doping the longerons, and laying the silk on and pulling it tight before the dope dries. It is advisable that the top be covered with one piece between the cockpit and former No. 6, and with smaller pieces around the tail surfaces.

When covering the wing, dope the silk to the tip and center ribs, then dope the leading and trailing edge and pull the silk tight to it.

When doping, first dope over the uprights and spars with coats of thick dope. Two coats of clear dope, thinned to brushing consistency, are then applied. For best results, the final color coat should be sprayed on. Cover the space between the landing-gear struts with a double layer of silk—or with light airplane fabric.

MISCELLANEOUS

The tail wheel is mounted on a wire fork bound to the rear of the fuselage. The wing-mount hooks are 1/8" aluminum wire, passing through scrap plywood gussets in the fuselage. Positions are shown on side view. The cockpit coaming is built up of scrap 1/8" sheet balsa. The rudder hinges are thin sheet aluminum. The diagram for the one-blade propeller is self-explanatory. If you wish to employ an old broken two-blader, use one from a motor larger than the one you intend to use in the air.

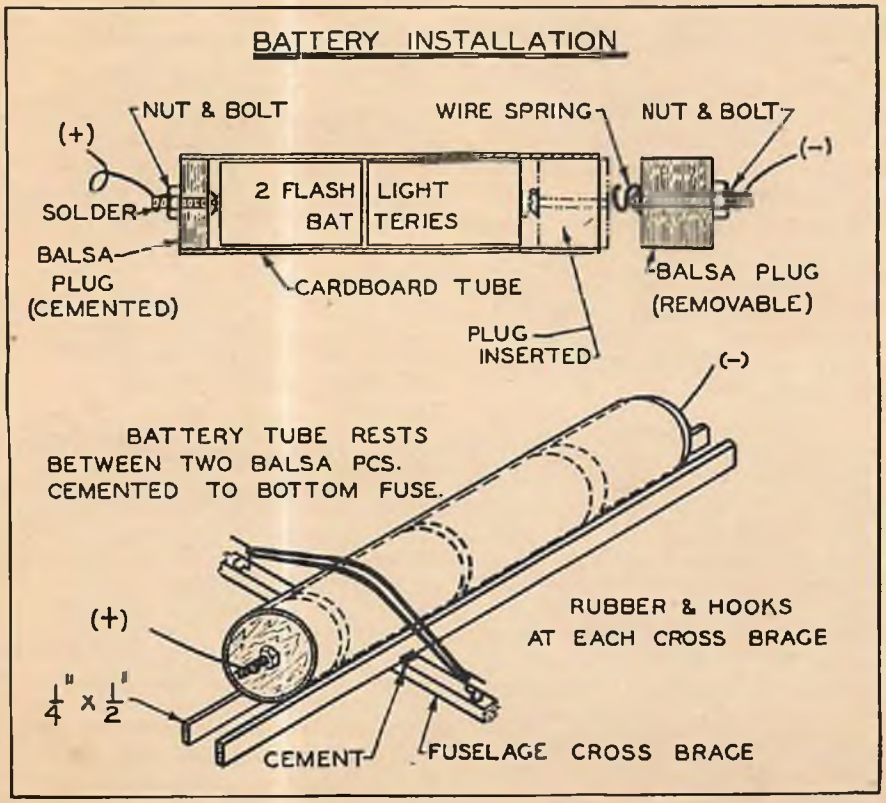
TESTING AND FLYING

Not all gas jobs can be tested in the same way, nor can all ships of the same kind be tested in the same way, due to differences of the flying grounds. However, this method will work almost anywhere that gas models are flown.

First check all surfaces to see that they are free from all warps, and line up properly. Balance the ship on the center wing spar, sliding the battery around until the proper balance is obtained. Before going any further, set the ship on the ground and take a few good photographs of it. If you are a photo fan and want good shots of your ship, this is the best time to get them, for sometimes even the best of ships do not look quite the same after the test hops.

Head the ship into the wind and give it a gentle push. If the ground is not too rough, it should roll along the ground and lift its tail. Keep this up for a while to see that the rudder or wing does not turn it. Then give it harder shoves, so that it can get off the ground. If it will not get off, move the battery back. Under no circumstances should it stall on the push-off. If it does, move the battery forward. If you are satisfied with it, start the motor and set the timer for about twenty seconds. Do not have the motor quite wide open. The climb should be slow and even, and the glide a bit steep for the first few flights. After you become acquainted with the adjustments of the ship, you can fly it in your own way. I usually flew the ship with one degree right thrust, or just enough to neutralize the torque, so that all turn was controlled by the rudder.

Good luck!



MATERIAL REQUIRED

(Balsa, unless otherwise noted)

Fuselage

10 pcs. 1/4 x 1/4 x 36" hard balsa, longerons and bracing

(Turn to page 89)

N.A.A. NEWS

(Continued from page 35)

through its affiliates, the Soaring Society of America, the National Intercollegiate Flying Club, and the Private Flyers Association. Each of these affiliated national organizations offers encouragement and inducement for both student and advanced pilot training. Members of these organizations are eligible to participate in many important national contests, meets, and cruises.

Procedure and rules for the conduct of a wide variety of air games, private-owner contests, and club cruises may be obtained by local club groups at low cost.

In addition, a series of official F. A. I. certificates are available to members of these affiliated organizations upon proper qualification and at a nominal fee. These range from the Class A Brevet for glider pilots to distinctive F. A. I. certificates attesting to the holding of government instrument-flying rating, et cetera.

N. A. A.'s survey of American air-youth activity has stressed the splendid work now being done by the many hobby-time and school-time organizations and individuals now active. The association recognizes and commends this work and solicits the affiliation with it of such organizations and individuals for the development of those national policies which will best advance air education and training in the United States. Full details may be had by addressing the secretary, National Aeronautic Association, Dupont Circle, Washington, D. C.

COLLIER TROPHY TO ARMY

When the stratoliners of tomorrow vault turbulent earthbound weather and ride calmly at great speed in the comparative serenity of the upper air, the N. A. A. committee responsible for this year's Collier Trophy award can well say, "We told you so." Given the job of selecting from a field of thirty-five aeronautical advances for the year 1937 that which represented the greatest achievement, it was their decision that the Collier Trophy should go to the Army Air Corps for the design and operation of the first pressure-cabin airplane to be flown successfully anywhere in the world.

No less than the President of the United States noted that every one of the Collier awards of past years stands today as a milestone of aeronautical progress. No greater tribute could be paid to the judgment of N. A. A. award committees, and this year's selection should prove no exception. By the army pressure-cabin method, pilots, passengers and crew can fly in ease and comfort at very high altitudes. By supercharging the air within the cabin, normal atmospheric conditions are maintained. It is an accomplishment which paves the way for day-by-day so-called "sub-stratosphere" flying by both military and transport planes.

At the invitation of N. A. A., and following a custom of long standing, President Roosevelt presented the trophy to representatives of the air corps at the White House on September 16th.

Four other important aeronautical achievements during the year were given honorable mention by the N. A. A. awards committee and so cited by Mr. Roosevelt. These were: the Boeing Aircraft Co.'s completion and demonstration of the huge four-engined flying fortresses, known by the air corps as the B-17 and XB-15; the successful development by the Buffalo Propeller Division of the Curtiss-Wright Corporation of the full-feathering, automatic controllable-pitch propeller; the test-piloting research in high-altitude flying done by D. W. Tomlinson of Transcontinental & Western Air; and the operating and maintenance methods and equipment developed by American Airlines which helped this air line to complete the flying of one hundred twenty-three million seventy-four thousand three hundred and eighteen passenger miles without fatal accident.

The difficult job of selecting those achievements most outstanding during 1937 was placed by the president of the N. A. A. in the able hands of a committee comprised of Major James H. Doolittle, chairman, E. R. Stettinius, Jr., Leighton Rogers, Edward P. Warner, William B. Mayo, George W. Lewis, S. Paul Johnston, Henry B. Dupont and T. P. Wright.

The air corps is justly proud that this is the fourth time the army has been honored with the Collier award.

Principals in the air corps research and development work leading up to the award for 1937 were Major Carl F. Green, Captain Alfred H. Johnston, and Dr. John E. Younger. Many others played important roles, such as Brigadier General A. W. Robins, chief of the material division, and Colonel Oliver P. Echols, under whose executive direction the work was carried on; Major Lingle, Captain Armstrong, and Messrs. Berger, Bonham, Young, Bogart, and Curtiss.

NEW U. S. AIR RECORD

A new international distance record for airplanes in the fourth category—that is, land planes powered with engines of less than one hundred and twenty-two cubic inch displacement—has been chalked up for the United States by Robert E. Bryant, of South Carolina, in his Aeronca C-3 monoplane.

Bob took off from Miami Municipal Airport and flew to Camden in some-

(Turn to page 93)

The Year's BIGGEST NEWS for Modelbuilders

GAS MODEL BARGAIN OF THE YEAR!

Speedline design for beautiful fast "high climb", and glide. Very simple to build. Nose wide enough to accommodate all known engines. Adjustable wing and stabilizer. Fin has name-plate with space for your name and address. Span 50". Kit contains all necessary balsa, all printed out, with full size C-D drawings, celluloid, leading edge, music wire, nuts, bolts, washers, etc.—absolutely everything except cements, dopes, wheels and power unit. Build the Cloudster now. If your dealer hasn't the Kit in stock, order direct, postfree. Dry Kit GP-5001, only..... $2.50

If you want all necessary dopes, cements and M & M Gas Model wheels included with order, add an extra $1.75. We can also include any standard make of motor at its regular advertised price.

THE CATALOG OF THE YEAR!

Now Ready! 50,000 copies of C-D's handbook

CATALOG No. 5

Yep, 50,000 of 'em—just off the press—for immediate distribution because of the "red hot" bargains they contain. Don't delay getting a copy—send today. It's the catalog of catalogs—literally bursting at the seams with thousands and thousands of items—topping by long odds any previous C-D catalog in quantity of offerings and bargain values.

There're 3 great Kit lines of C-D flying Airplanes; 5c Gliders, 10c Airplanes for beginners; low price models of other makers, and ready-to-fly models; Model RR equipment and Toy Trains, 20c and up in O, C-D, OO and HO gage; wide variety of gas model airplanes, and all well known makes of gas engines, gas and "rubber driven" supplies, also supplies for RR and ever so many other hobbies; race car, hand tools, power machinery, telescopes, microscopes, cameras and ship kits—practically everything a modelbuilder could wish for. And this great book is all yours for only one thin dime. Don't delay—send for your copy at once—TODAY!

ALL FOR ONLY 10c

The Year's Best "Rubber Driven" Values!

CURTISS F11C-2

Complete Dry Kit SF-49 (span 23⅜") only $2.50
Complete Dry Kit D-49 (span 15¾") only 85c

NEW C-D P26-A FIGHTER

Complete Dry Kit SF-60 (span 21") only $2.25
Complete Dry Kit D-60 (span 14") only 85c

If your dealer can't supply you, order direct by check or M.O. (cash at own risk). Outside U.S. add 10% extra. No C.O.D.'s.

Dealers: Get in on some real model sales. Write today for details.

CLEVELAND MODEL & SUPPLY CO., INC.

"Model and Hobby Supplies Since 1919"

4508-D79 Lorain Avenue, Cleveland, Ohio, U. S. A.

GYROPILOT

(Continued from page 27)

The drawing accompanying this article shows the sequence of the operations between the indication on the gyropilot instrument faces to the moving of the ship's control surfaces. Admittedly the drawing has the formidable aspect of seeming complicated, but actually the system is as elementary as the gyroscope itself.

The gyropilot and its hook-up to the controls may be likened to the human body. The gyropilot proper is the brain; the air-diaphragm and balanced air valve, with their connections to and from the gyro unit itself and the servo piston at the bottom of the drawing, form the nerve system; and the servo unit, or control mover, is the muscle.

The drawing shows one gyro represented as being in the box-shaped gyropilot. The gyroscope—nothing but a flywheel—is turned by a stream of air sucked by an air pump through the air-vent B.

You will note that the gyropilot is shown tilted, just as if the ship were banked. The whirling gyroscope remains vertical, of course, the rest of the apparatus tilting with the ship. Two airports, A and A1, are designated at either side of the gyroscope. As the unit tilts about the gyroscope one port, A, opens, the other port, A1, being closed.

The air conduits leading from the bottom of the box are part of a closed circuit. Naturally, the suction created in the box by the air pump will cause a movement of air through the conduits, as shown by the arrows on the drawing. Tracing the course of these two conduits, it will be seen that each leads to an opposite side of a diaphragm, E on the drawing. The circulation of air or differential in air pressure within the system will, quite evidently, displace the diaphragm. The diaphragm is connected to an air valve in the form of a cylinder and piston. The valve F shown in black, when moved by the displaced diaphragm, covers and uncovers ports which permit oil, under pressure, to flow to the servo unit. This servo unit is but another cylinder (H) and piston (G) which, when driven back and forth by the oil pressure, moves the controls to maintain level flight.

The follow-up system (J) merely removes this corrective control when the plane is restored to equilibrium, thus avoiding overcontrol. The follow-up is a wire attached to the servo piston moving with it and gradually turning the gear K which rotates the gyro until ports A and A1 are again both open.

The relief valves enable the pilot to overpower the gyropilot in case of sudden emergency. His normal shut-off is the rotating knob in the lower left-hand corner of the drawing. The passage I, when rotated by the pilot's shut-off lever, completes the oil passage between both ends of the servo cylinder, making it impossible for the servo piston to be moved by the gyropilot mechanism.

The complete apparatus includes the two separate gyroscopes mentioned, one each in the directional gyro and gyro-horizon components of the gyropilot; and three servo pistons: one for the rudder, one for the elevators, and one for the ailerons.

In Sperry's comprehensive little booklet, "The Sperry Gyropilot," a concise picture of the actual use of the gyropilot is given as follows:

"As soon as the aircraft is clear of the airport and on its course, the human pilot rotates the adjusting knobs on the control unit so that the three follow-up indicators match the gyro indications for direction, bank and climb. . . . He moves the engaging lever 'on' . . . climb knob is adjusted to the desired rate of climb . . . the aircraft continues climbing steadily until the cruising altitude is reached . . . another turn of the knob puts the plane in level flight.

"For large turns the desired angle of bank is set in. . . . When flying on the radio beam the precision with which these small changes in heading can be made while the gyropilot is in operation is an important factor in keeping the plane on course.

"On long flights a glide is often started as much as a hundred miles from the airport. A slight turn of the knob for glide . . . obtain the desired gliding angle . . . steady rate of descent . . . human pilot takes over controls . . . makes landing."

By this time, if you are wondering why it is necessary to utilize such relatively complicated methods of control, you are probably one of the many people who have suggested the "foolproof" expedient of a weighted pendulum or similar device. Pendulums, liquid levels, air vanes and countless variations have been tried without success. They work all right—but only on the ground. That's the rub. Centrifugal and acceleration forces play hob with the functions of such elementary endeavors.

The writer had the opportunity, together with the editor of this magazine, to inspect the Sperry plant. The "house of miracles," which this plant could be called quite accurately, includes in its eleven extensive floors probably the finest collection of precision machinery that the human mind can conceive. To one not too conversant with machines the effect must be stupefying. Notoriously expensive machines are in Sperry not by ones or twos but by entire rows!

Operating all kinds of precision lathes, gear cutters and delicate inspection devices are hundreds of skilled workmen, each one a specialist.

Our guide, an aeronautical engineer versed in every minute detail of the 60-pound, master "brain" that is the gyropilot, was typically enthusiastic about Sperry accomplishments. For instance, among many other tests of various parts he showed us the gyroscopes, or rotors, being tuned up to 9,000 revs by an air blast. A special instrument—Sperry seems chock-full of inventors—checked the balance of these rotors by a light beam which reflected alternately from polished and dark sections on the whizzing rotors. When done, the same instrument had indicated how many balancing holes should be drilled, where they were to be drilled in reference to circumference and diameter, and, to top it off, how deep each should be!

This same rotor, if it had so much as a fingernail scratch, would screech loud enough to be heard a block away when rotated at this speed.

It would be difficult to recount in less words than would complete a novel the wonder of Sperry. Today over 4,000 gyropilots are guiding the transports of world-wide air lines and numerous other private and military planes. Incidentally, if you should hear a Sperry man speaking in terms of tenths of an inch, don't let anyone kid you. He means ten-thousandths!

Editor's Note—The editors are indebted to Sperry pamphlets for the redrawing of the gyropilot and for descriptive passages condensed from the technical. Technical people, having a definite use for further information, should write to Sperry. A series of booklets, "On Instruments," "The Sperry Gyropilot," "The Gyroscope," are available.

WALTER GOOD'S RADIO CONTROL FOR GAS MODELS

In the January issue of AIR TRAILS, Walter Good, first-place winner for this event at the Nationals, brings you complete details, plans, and part lists! Control your valuable gas models by radio control for sport and also prevention of loss.

DODGING CLOUDS IN MEXICO

(Continued from page 19)

In addition to this fish catching, the gathering of turtle eggs was another thriving industry whose products we had to fly from Mexico to Texas. There was an old Mexican Indian at the fishing base who could guess to the day when the turtles would leave the Gulf to lay their eggs. He was also a weather prophet, often warning me about storms days ahead, and he usually was right. At first I tried questioning him to find out how he got his accurate information. But in the flying business in Mexico you soon come to take pretty strange things for granted. Otherwise you get soft in the head trying to figure them out.

Anyway, our five-plane transport system operated six months carrying fish from the Mexican fishing base to Texas, and in spite of a few minor mishaps we managed to get together a little money by the time General Escobar started his revolution. Then, taking no chances in that desolate stretch of country over which our route lay—for the revolutionists had a yen for taking pot shots at gringo airplanes—I had a wind-up conference with the boys and said to hell with flying fish any more.

After we suspended operations, most of the boys headed north, while I hung around the airport at Brownsville. I had feelers out for a few jobs, but things were lagging. I didn't care much, as I needed a bit of rest after many months of flying that desolate coast with a thousand-pound payload of stinking fish.

One thing I did do, however, was to assist the chamber of commerce in Brownsville in arranging an air program for their International Airport, which is now the Pan-American air base. I had the honor, at the banquet which was part of the program, of introducing Colonel Lindbergh to Amelia Earhart, who at that time was practicing up in her little Moth plane to take her transport pilot's examination in Brownsville.

Miss Earhart was sitting at my table at the banquet. She spotted Lindbergh and told me she would like to meet him. I went over to the colonel's table, induced him to return with me to mine, and then introduced the pair. We soon were discussing Amelia's flight to Wales, and Lindbergh told her that he admired her courage.

"I had a pilot with me" she said modestly. "I didn't do much."

In the Brownsville telegraph office one afternoon, while I was inquiring about an expected telegram, a small Mexican walked up to me and began asking in broken English about a "Mr. Hool, who was to come in *aeroplano*. Me very worried." I didn't know any Mr. Hool or the type of plane he was supposedly flying, so I took the nervously acting Mexican out to the airport to check on his friend, and turned him over to a Mexican attendant.

The next day I heard that the mysterious Mr. Hool was Theodore T. Hull, the president of the newly organized C. A. T. Lines. He had safely arrived the day before, and I was pleasantly surprised to learn that both he and his vice president, J. M. Grajales—none other than the nervous little Mexican—were looking all over town for me to offer me a job to fly the mail. They had an option on a valuable mail-flying concession which had to be exercised immediately to avoid its being canceled.

I met Mr. Hull, took to him right away, and thanked him for the offer to fly one of his ships. But I warned him that I would quit just as soon as the revolution was over, as I was expecting another position with very fine prospects.

For about three weeks, then, a half a dozen other American pilots and myself carried the mail into Mexico as far as Monterrey—a pretty soft job, like running a hack. We couldn't fly west of Monterrey, as Escobar was in control of all the western territory up to the Pacific coast. The job was over pretty soon because the revolution broke up, Escobar himself lighting out for Canada with a million gold pesos.

When we received the news of his flight, Hull, Grajales, and I were having dinner in Matamoras, just across the river from Brownsville. The Stinson people had offered me a job to fly in China—some sort of an experimental air line. I thought it would be most interesting, and was ready to shove off. However, I liked the C. A. T. outfit and had become most intrigued with Mexico. So when Hull put his hands on the table and said, "Oh, quit your kidding, maje, let's toss for it. Heads you stay in Mexico with me and tails you go to China"—well, sir, that coin decided I was to stay in Mexico as superintendent of operations and maintenance for the C. A. T. and begin pronto to do my share in blazing the air trails in that land of mañana.

Things went pretty bad in the beginning. For the first few months our payload consisted of no more than two passengers daily and a handful of mail. Even at that, it was quite a job to take off from some of our air fields—which were six thousand feet above sea level—with a couple of hefty passengers. Those two hundred horsepower Ryans did well at sea level, but lost plenty of power and coughed like a consumptive when you were forced to fly above twelve thousand feet to cross over the high Sierras.

Frequently our passengers were Mexican generals rushing around the country

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3/4x1 x 8 3—5c
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in their official duties, especially in connection with new revolts. We didn't like carrying the gentlemen in those underpowered Ryans, particularly when taking off from high-altitude fields. It was too much like flying beef on the hoof.

Let me illustrate:

One day one of our best pilots, Stormy Holmes, landed at Durango and handed over his mail to the postal agent. Six post cards, a love letter with a flock of X's plastered all over it, and two Sears-Roebuck catalogues was all he had with him. Our traffic agent, Jiggs Bansbach, greeted Stormy with the sad news that he would continue his trip west with a few Mexican generals. Stormy nearly fainted.

In those days, Mexican generals were more able with the fork than with the sword, their average weight being a good two hundred pounds.

Stormy had an English accent that you could fry and eat with a steak. "My Gawd, old fellow," he said to Jiggs, "this crate can just squeeze off the ground up here with the bit of mail one carries and full tanks of gas, let alone a brace of those waddling warriors."

Douglas army amphibian.

"Brace, hell," said Jiggs, "there's four of them."

"Can any of them talk English?" asked Stormy with murder in his cold blue eyes.

"Sure," said Jiggs, "the short fat guy with the two guns on his hips."

Stormy walked over to this English-speaking general and said determinedly: "I'm sorry, general, sir, but I will only be able to drag two of you with me."

"You will carry the four of us, Meester Piloto," said the general, roaring at the top of his voice. He was a little drunk and menacing. "We are generals!"

"My dear sir," spit out Stormy devastatingly, "it only takes ten minutes to make a Mexican general and damn near ten years to make an American transport pilot. I'll only take two of you, so what?"

"Two!" roared the general back. "But you are damn liar! Sometimes it takes two years to make a general."

They all laughed, and Stormy staggered off the ground with two of them.

It was a cockeyed life while it lasted. You never knew what you were going to be flying next, fish or mail, generals or prisoners.

One of the boys, Gordon Barry, was just getting ready to give his plane the gun one day and take off from the Mazatlan airport on his regular scheduled eastbound run when two soldiers, dragging a third man between them, approached the ship. The prisoner they had was a barefooted, ragged little man, handcuffed and shackled.

Explaining that the prisoner was one of a band of mine pay-roll robbers, the officer in charge asked Barry to fly him to Durango, where he was to be shot. Since the Mexican government gave us the telegraphy franking privilege and the mail concession, Barry knew he would be a fool to refuse it a courtesy flight, so he reluctantly agreed.

The soldiers lifted the prisoner into the plane, neither of them going along because they had to try and catch the other robbers, and Barry took off, circling the blue harbor of Mazatlan, so clear that you could see the wind ruffles on the water, and in a windless instant the shadows of rocks beneath the water. He spiraled up, gaining altitude for the flight over the high, jagged peaks looming ahead, and soon obtained enough height to straighten out for Durango.

The prisoner was silent, but Barry felt uncomfortable—as if the man's eyes were drilling into his back. He turned around. The poor prisoner, shackled securely to the seat, was smiling. "I would like a smoke, señor," he said.

"Take mine," said Barry, handing it to him.

"You know, señor," the prisoner said, "for three days I was hiding in a well. I could smell cooking in a ranch nearby. But this did not disturb me. One night I heard a couple of young lovers talking overhead. This did not disturb me, either. I heard the dogs go by and the men running with guns. But I was well hidden. Only for three days I could not smoke. So the fourth day someone was smoking a cigar near the well and I came out with my hands up over my head and asked, 'Compadre, give me one of your cigars.' It was a very good one, but not as good as this."

He was quiet for a while and then started singing a very popular old Mexican song.

"The corn song?" asked Barry.

"*Si, si, señor.* I was with Villa once. It was a good life. A gun, a woman to cook, and Villa to follow. We were going to take Mexico and then retire to the ranch. Only Villa was shot. So I became a real *bandido*. Oh, I suppose sometimes I was robbing my own people, but a man gets used to robbing. It is only the very good who know how to be quiet after a revolution. I will be shot, but I have had a good life. An American taught me something from one of your writers. The brave man does not die but once. Well, I have already died in imagination. So now I do not die."

There is wild country between Durango and Mazatlan. The mountains are precipitous, the cliffs are bare and straight, the barrancas deep, and there is hardly any water glittering under the plane for miles. Only rarely do you see the sudden leap of a mountain cataract or a flash of snow from an upper peak.

The prisoner was quiet, taking in all this inspiring wild scenery.

"*Es muy bonita,*" he said.

"*Si,*" said Barry, "it is very beautiful."

"I am glad that I have lived to see it. I think it was written that I should fly before I die."

Soon the plane dipped down and in a few minutes was circling the landing field at Durango. It leveled out and came in for a landing, and the prisoner wiped the smile off his face. Four soldiers ran up to the plane and dragged him out, his toes trailing wavering lines in the dust of the airport.

Barry said, when he told the story later, "I took off immediately, and I thought for a moment my engine was backfiring, but the noise that I heard was too rapid for an engine. Then I knew it wasn't the engine at all, and I set my course for Torreon."

You never knew what you were going to bump against next while flying in Mexico.

One day Henry Hoey was forced down in a cornfield in the mountainous country near the Indian city of Zacatecas. He wasn't on the ground more than ten minutes when he noticed a band of Indians approaching the plane in one lone line, the whole dozen of them picking up pebbles as they advanced toward the plane.

Hoey was scared stiff, for he had forgotten to carry his pistol with him that day. He stood there waiting for the Indians to stone him to death. He thought that he must have offended one

of their tribal gods, and that only his skin would make proper atonement.

One by one the Indians walked nearer to the plane, starting to toss their stones at the fuselage, the prop, the wings, and the propeller, until every part of it had been pelted. Then one of them, the chief, perhaps, walked over to Hoey and smilingly said in a clear, grave voice, speaking in perfect Spanish, "Now you have been born again."

With that the Indian file wheeled around and rapidly departed, leaving the startled Hoey cursing mildly to himself.

But sometimes the pastimes of the Mexican Indians weren't as mild as all that. One story I heard particularly sticks in my mind.

During the last Villa campaign, they told me, General Obregon entered the city of Torreon at the head of three thousand Yaqui Indians. And in case that doesn't mean anything particular to you, let me explain that the Yaquis can be just about the toughest breed of people this side of hell.

One day six of these Yaquis entered a very prominent cantina in Torreon, sat down at a table, and ordered a bottle of sotol, a cheap drink that almost kicks off the roof of your head after the *third round*. Now, it was a universal custom in Mexico, at all the clubs and cantinas, for a group to roll the dice after each round of drinks, to see who would foot the bill, and the Yaquis, deciding to pay for their bottle before they tackled it, proceeded to follow this custom.

But did these Indians do anything so tame as throwing dice? Not they!

One of them pulled out his six-shooter, removed all the shells but one, spun the barrel several times, pointed the gun at his own head, and calmly pulled the trigger.

His mouth muscles lifted slightly with relief as the hammer clicked on an empty chamber. Then he passed the gun to the man on his right, who also pointed it to his head, squeezed the trigger, heard the sharp, empty click, and unexcitedly passed it on.

When the fifth Indian's turn came he hesitated a moment, then repeated the actions of his predecessors. This time there was no click audible. In a burst of roar, his head seemed to cave in, and he leaped from his chair and collapsed *on the floor*. *Bad luck*, that fellow.

The other Indians rifled his pockets, paid for the drinks, and sauntered out of the cantina.

Shortly after the C. A. T. line started to operate, it gained an excellent reputation and began playing an important role in helping Mexico to attain Latin-American leadership in commercial aviation.

Everybody down there in Mexico seemed to be air-minded at the time. Oddly enough, if the newspapers carried a front-page story of an air tragedy in some part of the world, or even in Mexico itself, our passenger business picked up immediately. For no Mexican ever remained out of a plane through fear. They are all stoics and fatalists.

Our central route, along the historic Aztec Trail, from El Paso to Mexico City, was eleven hundred and four air miles long, and included stops at eight important cities, in every one of which hundreds of thousands of dollars of American capital are invested. Our air line played a most dominant part in the industrial development of this territory through the improvement of the communication system of Mexico. Within a few months after we started making regular trips, the air mail jumped on an average of two kilos—five pounds—daily, until we were soon carrying close to one hundred kilos of mail each day.

Between Durango and Mazatlan on the transcontinental route our planes flew over the lumbering regions near El Salto, and then across the highest point of the Sierra Madre range. The grandeur of the scenery from the air along this route almost defies worded description.

The Northern Canyon, about three miles in width and over eleven thousand feet deep, is an experience to behold. The western wall of the mountains bordering the canyon drops down in gorgeously colored cliffs and crags, interspersed with wooded mesas. As one sweeps one's eyes from the vantage point of a pilot's seat, many waterfalls can be seen, dropping hundreds of feet, and tumbling into foamy cascades, to form numerous small streams and rivers, hurrying on to meet the Pacific Ocean.

The hop across this mountainous region is a short one, taking only about an hour by plane. But as there are no railroads or highways, the only other way to travel is by horseback or burro, and that ordinarily takes from nine to ten days. Quite a difference!

We had our air base at Torreon.

Just after I had selected a site for a landing field, the general in charge of the garrison in that city sent me out a few hundred soldiers to guard the thousand prisoners who were clearing the spot of mesquite. About twice each day one of the prisoners would make a dash for the edge of the field in an attempt to escape.

If the prisoner got as far as the railway line that bordered the north of the airport, or got to the mountains on the south, the soldiers would permit him to go free. But within the limits of the field itself, the running prisoners were considered fair game; and hardly had one of these poor unfortunates run fifty yards when the soldiers would open fire

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with deadly aim. Only once did I actually see a prisoner escape.

Once I landed after dark on a hurried trip from Brownsville and was coming in to land in the middle of the field, dead into the wind, when I saw looming a few hundred feet ahead of me a large wooden cross. I opened up the throttle, flew around the edge of the field, and landed cross-wind, to avoid piling up against the cross. I then rushed into the small shack used as our operations office and asked the watchman, "What the devil's the idea of planting a cross on the runway?"

"Oh, Señor Major," he said innocently, with almost tearful eyes, "one of the prisoners was shot here today and died on the very spot. We had to mark it with something."

It seems to be a sacred custom down there to mark the place where a person dies with a large wooden cross, but I changed that custom that night.

There are cold aspects as well as warm ones down in Mexico. Or so Charlie Bucher would have you believe after his exciting trip with a boa constrictor.

Charlie was bringing the big snake over from Mazatlan one day as his only passenger, and thought that he had it safely stowed away in a sack placed in the rear of his Lockheed plane. Just as the plane took the air and was making a wide climbing turn over the Pacific, Charlie happened to glance back into the cabin and spotted Mr. Snake crawling toward the cockpit, with all his hundred pounds and fifteen feet of power gliding menacingly in Charlie's direction.

Charlie nearly threw a fit.

If he tried to point the plane downward in order to land he knew that the snake would slide down the aisle toward his feet. So that was out. And if he kept on flying level, it was simply a matter of moments until the huge creature would reach him under its own power.

Thinking rapidly, Charlie figured that his only chance was to keep his plane in a climb to make it as difficult as possible for the snake to reach him. So he continued sailing upward, ten thousand—twelve thousand—fourteen thousand feet, dangerously near the ceiling capacity of the plane, always keeping one fearful eye on that slowly approaching boa, and curiously wondering what the outcome of the adventure would be.

Just as Charlie was about to give up in despair—for it was plain that he couldn't keep his old Lockheed going perpetually upward—and was wondering whether going into a tailspin or something of that sort might make the snake too dizzy to be in a fighting mood, he noticed that the boa had stopped crawling toward him and was, in fact, quite dead to the world.

The fifteen-thousand-feet altitude that Charlie had reached—which was just about his limit in this plane—brought just enough cold temperature and light atmosphere to knock the boa constrictor unconscious. Immensely relieved, Charlie raced on to Durango, taking no chances on its waking up again. The boa was then securely tied in its sack and eventually landed at our headquarters at Torreon, where Charlie Bucher kept it as his personal pet for almost a year.

For six months during 1931, no less a personage than the famous round-the-world flier, Wiley Post, was one of our line pilots.

Wiley was one of the most outstanding pilots I have ever known. Despite the handicap of being blind in one eye, there was nothing that he couldn't do with a plane, from stunt flying to ocean hopping. He couldn't help feeling his handicap, however, and was often wondering whether the passengers had as much confidence in him as they would have in a pilot who was not wearing a cap over one eye. Often I discussed this problem with him, doing my best to discourage the slight feeling of inferiority which this mental attitude caused him to have.

Wiley, who was part Indian himself, loved the job of flying in Mexico, for it gave him a splendid opportunity to spot from his plane the stalking grounds of the many antelopes, deer, bears, jaguars, and mountain lions that he loved to hunt in his leisure time.

As a matter of fact, it was while we were discussing one of the hunting trips he planned and were sitting around idly in our Torreon quarters that he received a telephone call from Oklahoma City. When Wiley finished his conversation he walked over to me and said with obvious excitement and pride: "Maje, my friend in Oklahoma just told me to come back, and that he's going to finance me to make a solo flight around the world."

Wiley made that flight, and was on a long-distance jaunt with his friend, Will Rogers, when they both met their tragic end at Point Barrow, Alaska. I was terribly shocked when I heard the news over the radio, as I had been expecting him back in Mexico soon to help track a few antelope and grizzlies. I had also been expecting Wiley's last flying companion, the great Will Rogers, who would always arrange to travel over our lines on all his trips to Mexico, so that he could spend a night with the boys at Torreon. Everyone who met Will liked him instantly; and, if I am not mistaken, it was in Mexico that he and Wiley first met, starting that fine friendship between them that was so tragically interrupted.

Well, happy landing, Wiley and Will!

By the spring of 1933 it had become clearly apparent that the C. A. T. line's days were numbered.

There were several reasons for this. For one thing, we were unsuccessful in obtaining the United States mail contract, and the Mexican government mail contract hardly brought in sufficient revenue to cover our operating expenses. Then, to make matters worse, the Mexican government began insisting on the exclusive employment of Mexican pilots by the line, and was already considering passing a law to this effect—which has now been passed.

Because of this, American financial interests were very loath to put any more capital into the line.

The final blow came when poor Mr. Hull, heartbroken by the news that our American backers were withdrawing their support, and in no physical or mental condition to be flying a fast plane, crashed his new Bellanca into the Susquehanna River and died instantly.

So, too, died the old C. A. T. air line.

In retrospect, what can be said of our record with the C. A. T.?

Well, first of all—and I say this with great pride—in four solid years of operation, without the use of radio or radio beams, we lost only four pilots—three of these deaths resulting from very bad weather in the high mountains and one from carelessness on the part of the pilot.

Of the twenty-six American transport pilots who flew for the C. A. T., thirteen are now dead and thirteen living. But of the thirteen dead, no less than nine have since been killed flying here in America, as against the four who went down with us. My only explanation of this seeming anomaly is that when the men were flying down there in Mexico, over a very wild stretch of country, with poor equipment, and without help from radio, beams, and weather information sources, they were put on their own, and were flying from the seat of their pants, so to speak. Under these conditions, the pilots were taking no extra chances, and were using every ounce of observation and brain power they could command. The results certainly speak for themselves.

We didn't have the speed in those C. A. T. days that they have now; and for that time an average speed of one hundred and thirty-one miles an hour, which we *maintained* daily, and an operation record of ninety-eight percent on schedule, were something to look upon with definite pride. In addition, when one stops to consider that we had to overhaul our planes and engines in desert Mexican towns, two thousand miles removed from the airplane manufacturers, and that we were operating with a crew of five American mechanics and fifty Mexican helpers, one can see why I still have a very warm spot in my heart for the C. A. T. operations.

And always will.

ADVENTURERS

(Continued from page 37)

we printed almost an identical picture some time ago. The enlargement, however, is particularly good.

A new Air Adventurer is Lawrence Brautigam of Glen Ridge, N. J., who starts out by taking us to task for making certain pictures so large. He'd prefer to have a greater number of smaller ones. He'd toss out gas-model jobs and gliders, too, but he's out full-throttle for our craftsman awards.

Fred Everengham of Toronto does amazing things with the Falcon and Univex cameras. He has been given his photographer award for a series of shots taken around the Toronto Flying Club. And do they have equipment up there! Swell gateway leading into the field, neat hangars checkered in bright colors, beacons, meteorological offices and all the business.

From Palestine comes a new member, Joe Baer, who is the secretary of the Jewish Youth Group and also a member of the Palestine Aero Club at Jerusalem. Joe tells us that they take training on an English Gypsy Moth. He sends us much interesting information and states that gliding there is about through, since it is very dangerous to have to land near Arabic settlements out on the desert.

Ernest Lovell, a new member from Roxborough, Pa., writes in to tell us of the activities of a group of friends of his who take Air Trails regularly. They have banded into a smooth-running organization and build all sorts of models, and are now working on some sort of radio-controlled job that may be a sensation. They also keep a record of their doings on a motion-picture film. Lovell, who is a theater projectionist, takes the movies with an 8mm. camera. Here's a swell crowd to get in Air Adventurers. He also adds that sometimes they experience difficulty in getting Air Trails in Roxborough, and we are looking into it. If any other members have this trouble in their town, will they please let us know at once so that we can attempt to remedy it?

Dalton Massey of Burnet, Texas, who comes through with a swell letter this month, has an idea of presenting a complete layout of all the ships ever used in the Bill Barnes stories. He has a grand idea, and we'd like to think it over. Like many others, too, he wants more articles on modern aircraft engines.

We fire a full salute of guns for the Panama Division of Air Adventurers, who have sent us a full and complete report on their activities. The report has been carefully drawn up in regulation manner, properly typed and officially sealed. A grand job, Panama, and thanks especially to Abel Villegas, Jr., the honorary commander. We wish we had more divisions as active and as sincere in making their reports.

A long letter, in something of a report style, comes in from Charles H. Rich of Belle Fourche, S. D. Charlie has only just found out about Air Trails, but he certainly went to town telling how he likes us. He was lucky enough to be out there during the recent war games, too, and says it was marvelous.

We have a flock of new photographers this month. Mervyn Jerrard of Winnipeg has clicked with three nice shots of Trans-Canada Airline Lockheed 14s. Glen Lunde of La Crosse, Wis., sends in a picture of a Northrop A-17 which has rare detail. Craig S. Sharp of Crescent City, Cal., has qualified with two pictures, one of a Buel at three-quarter position, and another showing a close-up of the fuselage and cabin. A particularly swell picture of a Douglas DC-3 airliner, the flagship *Rhode Island*, has been sent in by John W. Averell of Whitman, Mass. H. Bibeaw of Newington, Conn., offers a shot of a Waco cabin plane taken at Brainard Field, Hartford, and Stanley Segal comes through with a photo of an Aeronca taken with a French Celas folding-type camera.

Our old friend E. H. Cocks of Canterbury, New South Wales, has covered his Flight Mechanic test with glory, having sent in a photograph of an original endurance model which has made many fine flights over thirty seconds. Erlend Anderson is another newcomer into the Airplane Mechanic ranks. He has built a model of a Stinson SR7 that appears to be a pippin. It has movable controls, cabin doors that open, and a beautiful paint job.

"I've been reading Air Trails for about two years," says Robert Alsworth of Niagara Falls, N. Y., "and I've decided that it is about time I joined Air Adventurers." So he sends in his dime and coupon and seems to be well on his way. Like many more he went wild over our September issue, and we hope we can keep up that good work, too. We can if you fellows back us up and keep coming in with your stuff.

Imagine a guy who practically lives on the Cleveland (National Air Races) field? That's where Donald Polak comes from to join our outfit. He says he has seen all the Cleveland shows and has learned much of the progress of aviation in that way.

We got some inside stuff from Charles Rutkowski of Springfield, Mass., who sends us pictures and newspaper clippings of a new military two-seater fighter being built by the Miller Aircraft Company of that city. The plane may be ready for official try-outs soon. The late Frank Hawks was interested in this ship, and it is said to have many of the speed features of the *Time Flies* in her make-up. Thanks, Charlie. Let's have more when your papers give it out.

Another new member of our Airplane Mechanic group is Howard Harris of Toronto, who sends in pictures of two swell models, one a DC-4 and the other a four-engined flying boat. He asks us why there are so few high-wing transport monoplanes any more, and we frankly do not know, unless it's a matter of speed, as usual.

Ray Chauvin o Fiskdale, Mass., thunders in with a loud squawk about American military plane manufacturers who are selling their first-line equipment to foreign powers. He wants to know why Air Adventurers can't do something about it. We can't do much, of course, because the sales are all actually legal as the laws stand now.

SKYWAY BALSA CAN'T BE BEAT!

FREE with all purchases over $1.00 your choice of: (1) Model Water Sprayer. (2) Model Builder's Knife. (3) Choice of 2-20" Model Plans—Curtis, Heath, Boeing, Driggs, Bellanca.

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2x2 ....1 for 16c
2x3 ....1 for 22c
2x4 ....1 for 38c
3x6 ....1 for 72c

NOSE BLOCKS
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2x2½x1 .....3c
3x3x1 .....4c
3x3x2 .....7c
3x3x3 .....9c
4x4x2 .....11c
4x4x3 .....15c

18" BALSA
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1/16x3/16 18, 5c
1/16x¼ 15 for 5c
3/32x3/32 20, 5c
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1/32x2 3 for 10c
1/16x2 3 for 10c
⅛x2 2 for 10c
¼x2 ...2 for 11c
¼x4 ...2 for 22c
sheets or 36" lengths, double above prices; add 10c packing charge for 36" lengths.

PROP. BLOCKS
⅛x ⅛x 3 7—5c
⅛x ⅜x 6 6—5c
⅜x1 x 8 3—5c
⅜x1¼x10 2 5c
½x ¼x12 3c ea.
1 x1½x12 5c ea.
1 x1½x15 6c ea.
1 x2 x18 9c ea.

WHEELS per pr.

	Birch	Bisa	Celu
½	.01	.03	
¾	.02	.04	.05
1	.03	.05	.07
1⅜	.04	.07	.10
1¾	.06	.09	.16
2		.11	.30

Alum. Tubing
1/16 .....6c ft.
3/32, ⅛...8c ft.
5/16, ¼ ..10c ft.

PROPELLERS
Balsa Paul-O-Mach. Cut Wise
4" 4c 3c
6" 5c 11c
7" 6c 16c
8" 7c 20c
9" 8c 21c
10" 8c 25c
12" 10c .....
14" 14c .....
16" X 18c
16" 16c 72c

ALUM. WHEELS
1" pr. 8c
1½" pr. 11c
1¾" pr. 14c

Sheet Aluminum
.003 ..sq. ft. 10c

ALUM. LEAF
2 Sheets for 1c

TISSUE, AA
All col., doz. 19c
Silver ...ea. 5c
Superfine, wh. 5c

CAMEL'S HAIR BRUSHES
Small 3c; med. 5c
Large 8c

Wood Veneer
20x30" ..1 for 9c
2 for 17c

BAMBOO PAPER 2 for 15c
11 in. BAMBOO
1/16x¼ 6 for 5c
Shredded 40—5c

REED
1/32 or 1/16"
3 ft. 1c
⅛ in. ...3 ft. 2c

CEMENT
CLEAR DOPE
THINNER
1 oz. 5c, ½pt. 20c
2 oz. 8c, pint 50c
Colored Dope
1 oz. 5c, ½ pt. 35c
2 oz. 9c

MICROFILM
One oz. bottle 10c
Sheet Celluloid
2x6—2c 6x8—10c
12x16 .....15c

RUBBER LUBRICANT
Large bottle 10c

WING AND TAIL LIGHTS
5/16"..3 for 10c
9/16"..3 for 15c
Gas Model Silk
super quality
per yard 10c

SANDPAPER
Doz. sheets 5c
BROWN RUB.
1/16 sq. 15 ft. 5c
⅛ flat ..15 ft. 5c
3/16 flat 12 ft. 5c
Skein 225 ft. 70c

5 FOOT BALSA
⅛x⅛ ...30 20c
3/16x3/16 ..12 20c
¼x¼ ...10 20c
⅜x⅜ ... 8 20c
½x½ 6 20c
¾x¾ 3 20c
1x1 .... 1 8c
1½x1½ .. 1 10c

Specify whether hard or soft. Add 25c pack. charge on 5 ft. lengths.

DUMMY RAD. ENGINE (Celu.)
1½" dia. ... 8c
2" dia. 12c
2¼" dia. ...14c
3" dia. 17c

NOSE PLUGS.
⅜" ...1 doz. 5c
⅝" ...1 doz. 10c

MODEL PINS
1" 5c

THRUST BEARINGS
½ Doz. Small 4c
Large 6c

INSIGNIAS—
French, American, English, German
1¼" ....4 for 3c
2" .....each 1c
24 and stripes 5c

DOWELS
1/16x6 ...doz. 5c
⅛x18 ...2 for 3c
3/16x18 ..2 for 5c

WIRE
.014 6 ft..2c
.020 .028 6 ft..3c
.034 .040 6 ft..6c
1/16" 3 ft. 5c
⅛ 5 ft. 25c

PROP. SHAFTS
2 for 1c

BOMBS
¾"...1c 1¼"...7c
3"....12c

GUNS WITH RING MOUNT
1¼" 10c 1¾" 15c

MODEL BUILDER'S KNIFE
Surgical steel blade 10c

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FREE POSTAGE on all orders in U.S.A. Add 10c for packing cost on all orders. For U.S. possessions, Canada or foreign countries add 15% on orders over $1.00; under $1.00 add 15c.

SKYWAY MODEL AIRCRAFT SUPPLY CO.

383 Seventh Ave., Dept. A, Brooklyn, N. Y.

LIGHT PLANE FLYING CLUBS

(Continued from page 31)

are inclined to join the group. You are in business, or you have a position which pays you a fair salary. You may even be married or the support of one or both parents. You are also reasonably patriotic, you like the idea of flying, and this new arrangement is just up your alley. It will not interfere with your business or your job. You may be able to sign up for week-end instruction, or take late-afternoon flight training. You are a suitable type. You have a fair amount of education. You can pass the required physical examination and you are all set.

But—what about protection for those who are dependent on you? After all, there are such things as flying accidents, and there will be more under these nationwide training conditions. Your present life-insurance policy will not cover you. Few even cover you on regular scheduled air liners, until they have been in force for several years. Will our hypothetical air guard expect you to take out further insurance to protect yourself, your business or your dependents? Or will there be some form of blanket coverage which will protect all members to the extent of $10,000 for death?

I mention these points to show you readers what to look for if such a move takes place in this country. I am not trying to build up a picture of cheap and easy flying training for all, and then break it down with all these under-cover objections. They are the points you must consider when an American air guard comes along—and it will come much more quickly than many believe.

Many will pooh-pooh my idea, saying that it is un-American and that there will never be any real need for such a plan. There's always one answer to this. If the war department considers it imperative that we have a national guard to back up the regular army, and if the navy department believes in the idea of a navy reserve, by what argument can they talk us out of some form of air service reserve on an equally wide scale? It is not enough to say that we have national guard squadrons or a marine air service and coast guard patrols. Actually there are just nineteen national guard squadrons on paper, and we all know that a national guard squadron is nothing more than a skeleton outfit with perhaps six planes on its books at the most. We can always build planes, but the question is can we train men, enough men, in time, to take the machines into the air and do something?

Of course we shall have an air guard system of some sort. It will be forced upon us. Our present flying clubs will be the real background of it all, even though army and navy instructors do the teaching. You who volunteer will be taught to fly cheaply, and you will be expected to maintain some of the skill thus obtained by taking further instruction at prices per hour considerably higher than those of your original training. This is another point you must consider. Once you have obtained your ticket, whether private or amateur, you will be through as far as government-provided training is concerned. There will be hundreds of others who will be waiting for you to "graduate" and take your place in the cockpit. After that, you will be completely on your own, and you will have to dig down and pay for further time yourself, unless the powers that be provide temporary entrance into some of our national guard units where you can continue with better and more improved types of ships—and further military subjects.

How far such a plan can be carried is hard to predict at this point. Much will depend on how many out of the first 20,000 who volunteer will be found physically capable of taking flight training. Many will discover to their amazement that they have no sense of balance, have bad eyesight, defective lungs or bad hearts. These of course will be immediately weeded out. A number of those who pass all the physical requirements will discover that they suffer from what is technically known as aerophobia, or fear in the air. It is nothing to be ashamed of, naturally, for we all have some kind of phobia. You can either fly or you can't.

I remember once in England during the World War. I was one of a number of men specially selected from infantry, artillery, cavalry or engineer regiments for flight training. I had done many months as an aerial gunner and was very tired. The others were fine specimens of Canadians, Australians, South Africans and some Americans who had served in Canadian regiments. There were forty-eight in the group I started with, and after four hours of intense physical examination in which every part of our frames was carefully examined, only four of us came out with white cards that said we could go to the R. F. C. flying school. This just gives you an idea what military flying demands. A civil air guard system, of course, would not be so strict, but it will probably be stricter than an ordinary examination for regular amateur flight training.

As I said before, a system of mass training will come, and it will be well for all of you who contemplate joining such a movement to consider all these angles. If you hope to take advantage of it, be sure you are in reasonably fair condition. Make certain that the plan provides suitable protection for yourself and those dependent on you. Be prepared to assume some military obligations and to take several military subjects as well as straight flying. Then, when you have taken your ticket, be prepared to carry on, on your own, purchasing time at terms far above those you have been paying for your initial training.

Once you have digested all this, there will be very little for you to worry about. Rest assured, you will get good training and you will be in a grand organization, one you will hate to leave when your time is up.

AIR TRAILS ADVERTISERS—DECEMBER, 1938

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MOFFETT TROPHY

(Continued from page 69)

Both the propeller shaft and the rear hook are covered with 1/16" inside-diameter rubber-spaghetti tubing to prevent the wire from cutting through the rubber motor.

Rubber motor is made up of twenty-six strands of 1/8 x 1/30" brown rubber. The motor length is 40".

FLIGHT

This is characterized by a slow, steady climb. However, the climb continues long after the faster-climbing models have started their downward glide. No warp is used for the wing. Make it a point to keep the wing flat throughout the span.

When adjusting a new model, Nelder first tries for a good glide. After getting it to his satisfaction through experimentation with a variety of different adjustments, he gives the model a short flight with a few turns in the motor. If the model shows a stalling tendency, it can be corrected by additional down-thrust. But in no way change the setting of the wing and tail so as to interfere with the best glide setting. Strive for the maximum in climb. Use the least down-thrust possible without the danger of stalling.

The model climbs in seventy-foot circles, and to the right. During the glide the diameter of the circles remains practically the same. This feature can readily be controlled by the amount of right thrust put into the propeller-shaft adjustment. Likewise, the right thrust adjustment can be used to control the turn during the climb. If the weather is windy, use slightly more right thrust and a tighter circle during power and glide. This will prevent the model from mushing and losing its hold on down-wind turns.

The model is wound through the front. Attach the front of the propeller shaft directly to the winder. It will not be necessary to detach the rubber from the propeller shaft. The motor is given between eight hundred and nine hundred turns.

MATERIALS

(Balsa, unless otherwise noted)

Fuselage

- 4 pcs. 1/8 x 1/8 x 31½", longerons
- 12 pcs. 1/8 x 1/8 x 24", bracing
- 2 pcs. 3/16 x 1/4 x 6¾", wing mount
- 2 pcs. 1/16 x 3/16 x 8" (bamboo), wing mount
- 1 pc. 1 x 1¼ x 1⅝" (hard), nose block
- 1 pc. 3/16 x 3/16 x 1½" (spruce), rear hook anchor
- 4 pcs. 1/8 x 1/8 x 6½", tail boom
- 2 pcs. 1/8 x 7/8 x 2½", landing-gear gussets
- 1 pc. 1/8 x 3/8 x 1½", wing-mount gussets
- 1 pc. 1/16 I. D. x 6½" brass tubing, landing gear
- 2 pcs. 1/16 x 1/4 x 8½" (bamboo,) landing gear
- 4 pcs. 1/8 x 1¾ x 1¾", wheels
- 1 pc. 1/16 x ½ x 15", front and rear plug
- 1 pc. 1/8 x 1 x 7", front fuselage
- 2 pcs. 1/8 x ¾ x 6", rear fuselage and tail boom
- 6 pcs. 1/32 x 1 x 12" planking, front fuselage
- 2 pcs. 3/32 x 1 x 12" planking, tail boom

Wing

- 4 pcs. 3/16 x 3/16 x 14", leading edge
- 2 pcs. 3/16 x 3/16 x 9", leading edge
- 4 pcs. 1/8 x 5/8 x 14", trailing edge
- 2 pcs. 1/8 x 5/8 x 9", trailing edge
- 5 pcs. 1/8 x 1/8 x 14", spars, (center section)
- 4 pcs. 1/8 x 1/8 x 9", spars
- 2 pcs. 1/8 x 1/8 x 8", spars
- 2 pcs. 1/8 x 1/8 x 6½", spars
- 2 pcs. 1/4 x 7/8 x 2", tips
- 1 pc. 1/8 x 1 x 1", gussets
- 10 pcs. 1/16 x ¾ x 12", ribs

Elevator

- 2 pcs. 1/8 x 1/8 x 8¾", leading edge
- 2 pcs. 1/8 x ½ x 9", trailing edge
- 4 pcs. 3/32 x 3/32 x 9¼", spars
- 4 pcs. 3/32 x 3/32 x 8¼", spars
- 2 pcs. 3/32 x 3/32 x 8¾", spars
- 2 pcs. ¼ x 5/8 x 4", tips
- 3 pcs. 1/16 x 7/16 x 12", ribs

Rudder

- 1 pc. 1/8 x 3/16 x 5½", leading edge
- 1 pc. 1/8 x 1/8 x 6¾", center spar
- 1 pc. 1/8 x 1 x 7", trailing edge
- 1 pc. 1/8 x ¾ x 4", tips
- 1 pc. 1/8 x 5/8 x 12", lower rudder
- 3 pcs. 1/8 x 1/8 x 6", ribs

Additional Items

- 1 pc. 1⅞ x 18", propeller block
- 1 pc. 1/16" dia. x 12" wire, rear hook and shaft
- 1 pc. 1/32" dia. x 3" wire, nose and tail attachment
- 1 pc. 1/16 x ¾ x 5" sheet brass, bearings, plates, etc.
- 1 pc. 1/16" inside dia. x 2½" rubber tubing, covering for hooks
- 1 ball-bearing washer

dope, cement, and 4 sheets of tissue

PURSUITEER

(Continued from page 80)

- 7 pcs. 1/16 x ¼ x 18", stringers (top)
- 5 pcs. 1/16 x ¼ x 36", stringers (bottom)
- 2 pcs. 1/8 x 2 x 18", formers
- 1 pc. 1/8 x 4½ x 7½" 3-ply birch, bulkhead #1
- 1 pc. 3/32 x 1 x 12", cockpit
- 2 pcs. 1/32 x 2 x 12", cowling
- 10 pcs. 1/16 x ¼ x 2¼", cooling shutters
- 1 pc. 1/16 x 3⅜ x 8" sheet dural, motor mount
- 14 1/8" diameter machine screws, motor mounting, etc.
- 8 pcs. ¼ x 2 x 12", cowl
- 4 pcs. 1/8 x 3/16 x 3¾", cowl
- 2 pcs. ¼ x 1¾ x 11", wing mounts.
- 2 pcs. 1/8" dia. x 5½" aluminum wire, wing attachment
- 1 pc. 1/8" dia. x 48" steel wire, landing gear
- 1 pr. 3½" dia. airwheels
- 1 1⅛" dia. sponge-tired wheel, tail wheel
- 1 pc. 1/16 dia. x 6" steel wire, tail wheel attachment
- 2 pcs. ¼ x ½ x 12", battery installation
- 1 slide switch
- 1 booster jack
- 1 small patch of silk, landing gear
- 2 pcs. 1/8 x ¼ x 36", fairing strip
- 1 cardboard tube to fit 2 flashlight cells
- 1 pc. ¾ x 1¼ x 8¼", propeller
- 1 2" length wood screw, propeller

several feet of fine iron wire, propeller 1/8" dia. solder wire, propeller

Wing

- 2 pcs. ¼ x ½ x 26", leading edge
- 2 pcs. ⅜ x 1 x 25", trailing edge
- 4 pcs. 1/16 x ¾ x 30", spar
- 4 pcs. 1/16 x 5/8 x 30", spar
- 2 pcs. 3/32" dia. x 12" aluminum tubing tips
- 12 pcs. 1/8 x 1¼ x 18", ribs

Tail Surfaces

- 14 pcs. 1/32 x 2 x 24", covering
- 3 pcs. 1/16 x ¾ x 18", ribs
- 2 pcs. 1/16 x 1/8 x 36", spars

Additional Items

- 2½ yards silk or other suitable covering

dope, cement, thinner, clothing snaps, pins and thread

AIR PROGRESS

(Continued from page 10)

AIR FORCES

Models of the Canadian-built Norseman have been turned into classroom trainers for the Royal Canadian Air Force. They have been equipped with military instruments so that several pupils may take flight training, navigation, aerial photography and radio all at the same time.

* * *

British critics continue to argue that most American fighters are still being designed along the lines of the famous Gee-Bee racers. One noted aeronautical writer has stated that "there is too much of the Zeppelin and not enough of the tadpole about their lines"—if you can figure that out.

* * *

A batch of sixteen Hawker Harts, part of a consignment of one hundred obsolescent machines bought from the British government for about a thousand dollars each, has arrived in Johannesburg for the South African Air Force.

* * *

Seventeen naval flying boats recently completed another trans-Pacific flight from San Diego to Honolulu in seventeen hours and twenty-one minutes. It was another commonplace routine transfer from California to Hawaiian duty.

* * *

Army and navy officials are en route to Puerto Rico to consider plans for the establishment of an air base at Isla Grande across from San Juan harbor. The navy men are interested in space for submarine, air, mine and destroyer bases.

* * *

Ivan Eremeeff, a former Russian engineer, now a resident of Philadelphia, claims to have devised an aerial torpedo which will have a speed of six hundred and fifty m.p.h. It will carry two cannon and be able to attack enemy points a thousand miles away and inflict heavy damage with little or no damage to itself. Whether it is to be controlled by remote control—radio—or by a pilot has not been stated.

* * *

According to reports from abroad, six Sunderland flying boats of the aerial dreadnaught type have already been built and are on their way to Singapore. The Sunderland is a military version of the Short Empire flying boat, and was sprung on the aviation world with startling suddenness this summer.

* * *

The newest German Messerschmitt fighter is said to be a single-seater pusher with an eighteen hundred h.p. engine, which will have a top speed of something near four hundred and fifty m.p.h. There is much hush-hush to this plane.

* * *

The million-dollar flying battleship which has just been put into the water by the Consolidated firm in San Diego is now being put through its initial flight tests. It is said to be the world's most heavily armed flying boat, with a range of four thousand miles. It has four motors and weighs twenty-five tons.

* * *

San Salvadore has purchased six Caproni bombing planes from Italy.

* * *

The Sperry Gyroscope Company of New York recently received an order for five hundred thousand dollars' worth of delicate instruments used in flying and navigating military planes.

* * *

Mysterious raids on the hangars and buildings of the army air base at Crissey Field, outside of San Francisco, are being investigated by G-men. One sentry recently fired on several raiders and was slugged for his efforts. Later it was found that a closed hangar door had been tampered with.

* * *

Australia is preparing to place an order for a large number of British bombers of a type not as yet accepted by the Royal Air Force. These planes are said to be the fastest of their class in any air force and will materially aid in the defense of the little continent Down Under.

* * *

The P. Z. L. Company of Poland has just completed for test a new medium-type bomber known as the P.Z.L.37. It is a two-engined, low-wing monoplane with a top speed of two hundred and seventy-three m.p.h. It carries three machine guns and two thousand eight hundred sixty-six pounds of bombs. Bristol Pegasus engines are used.

* * *

The French defenses in the Pyrenees are being supplemented by a balloon barrage which will be sent up to a height of sixteen thousand feet.

* * *

The Norwegian air force is being developed to take the strain of current events in Europe. Many British Gloster Gladiators have been purchased. The bombing squadrons are also to be equipped with new Caproni CA.135s, and later on both types, if satisfactory, will be built in Norway under licensing contracts.

RECORDS AND REPORTS

According to inside reports from Russia, Col. Charles A. Lindbergh will attempt a non-stop flight from Moscow to New York early next year. His companion on this flight will be M. Gromof, a noted Russian aviation authority. This flight may mark the opening of a regular scheduled run between the two countries.

* * *

Truman Netzeley, a seventeen-year-old lad who never had any flight training, recently "borrowed" his brother's second-hand monoplane and took it into the air, near Troy, N. Y. He managed to stay up for about ninety minutes, all the time dropping notes asking what one did to get it down. Finally he decided to come down after asking the wind direction, and made a perfect landing in a pasture next to the one from which he had taken off.

* * *

A small "flivver plane" set a new endurance record by remaining in the air for four and a half days during the New York State Fair. The pilots refueled by taking on five-gallon cans of gasoline from a speeding automobile. The record flight came to an end when the plane landed in a shallow section of Lake Onondaga for some unexplained reason. The pilots were Merrill Phoenix and Harold Allen.

* * *

Paul Codos, noted French pilot, has been named Chef de Service Aerien of Air France-Transatlantique. This post gives Codos dictatorial powers of control over all French experimental flights across the Atlantic.

* * *

It will be possible to make ship-to-shore phone calls from the new Boeing Clipper once she is put into regular service. The new double rudders and fins added to the new craft are expected to give more control while taxiing.

* * *

There is money in aviation these days. Seven of the major manufacturers grossed earnings of more than eight million dollars in the first six months of 1938. In the first seven months of 1938 domestic air lines flew seven hundred and four thousand passengers, as compared with five hundred and eighty-five thousand during the same time last year.

* * *

John K. Northrop, a former official in the Douglas Aircraft Co., has just purchased manufacturing rights on a Diesel engine suitable for aeronautical work from the Victor Engine Co. of Great Britain. It will, of course, be "Americanized" for domestic production, and so will not be ready for delivery until sometime late in 1939.

* * *

Marshall Jones of Boston have just published Willis Fitch's book "Wings In the Night," a story of American airmen fighting on the Italian front. It will come as a pleasant change from the usual run of World War stuff, and for the first time tells the true story of the trials and tribulations faced by fighting airmen in that particular sector.

MILITARY AERONAUTICS

(Continued from page 23)

for its own air service. It locates valuable targets for its own artillery and controls the fire. It keeps the ground commanders informed as to their own front-line positions and those of contacting forces on the flanks. It helps in locating the enemy front lines and provides information that aids in locating the enemy's weak points. It also watches back-area movement, mining and trench-digging operations and the disposition of enemy forces and supplies.

Aviation observation is generally divided into two sections, heavier-than-air, and lighter-than-air which uses captive balloons and dirigibles, but in this article we will consider only observation as carried on from the cockpits of our two-seater planes.

During the World War, an observation squadron was generally made up of three flights of six planes each and officers and men to handle them. Today, in the United States air service, the observation squadron is generally composed of three flights of four planes each. Usually there is an extra ship available for the squadron commander. Flights are headed by captains.

An observation group consists of group headquarters and a headquarters squadron, one service squadron and four tactical observation squadrons. At present, as far as is known, there are about ten observation groups in the U. S. air service. In addition there are about nineteen National Guard units run as observation squadrons.

The modern observation plane is probably the most complex air weapon in existence. When we consider the wide range of duty expected of it, it is no wonder that experts, authorities and designers continually argue as to what is the ideal machine for the work.

In the first place, the modern observation plane should possess high speed at altitudes above 15,000 feet. It must be able to penetrate far into the enemy lines and carry out its work. Then, it must have what is known as a wide range of speed, to jockey and maneuver to outwit the enemy defenders and to confuse the aim of enemy anti-aircraft gunners.

The observation ship must have good all-around vision and still provide protection from the elements and slipstream for the crew. It should have an opening or window in the cockpit used by the pilot to enable him to fly a consistent course over a selected strip of ground during photography missions. The observer, who also acts as a gunner, must be suitably protected against the slipstream during his observation duties.

The observation ship should have a range of at least 400 miles if it is to carry out missions of any tactical value. It should be suitably armed both front and rear for protection, but not for any form of attack. No bombs are carried, and no offensive measures are ever carried out, because it is presumed that the crew have obtained valuable information which must be delivered to the base or staff.

The observation plane should have mountings for at least two different types of cameras. One is set in a floor mounting for vertical photos and the other on a flexible mounting for oblique pictures. In addition it should carry a two-way radio set of intermediate frequency and a 300-mile operating range.

Heavier-than-air observation is in turn divided into two distinct groups in the U. S. air service. Corps observation aircraft are designed for daylight missions and shallow penetration into the enemy territory. They are light, single-engined, two-place machines with an endurance of from one and one half to two and one half hours at full throttle, or from three to four hours at cruising speed. Most observation, except artillery adjustment, requires flights of one hour or less. Artillery "shoots" usually require flights ranging from one to two hours.

Army observation work requires larger machines capable of longer and possibly night missions. They carry elaborate navigation equipment and are designed for distance missions into enemy territory with high pay, or service loads, and are armed to put up respectable defense against enemy fighters.

The Douglas OA-3 and OA-4 of course are twin-engined planes used for army observation work, while the others are all single-engined planes.

The crews of observation planes are specialists in their line. The pilot is skilled, not only in the handling of a military plane, but in making visual observation while directing the course of the machine. He is a skilled aerial fighter and quite capable of taking care of himself and his ship against enemy fighters. He is trained in the art of luring these hostile machines into "death areas" where his own anti-aircraft gunners can range them, to assist him and possibly destroy his attackers.

But it is the observer who comes in for much of the credit won by first-line observation squadrons. He is a specialist in radio, cameras and guns. In a pinch, he can fly the plane back to safety through the dual control system in case his pilot is wounded or killed. He is versed in ground movement and at a glance can tell a division, regiment or battalion on the move. He can find enemy redoubts, gun emplacements and

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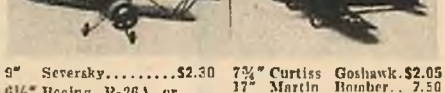

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The following are made from advertised kits on the market and are equipped with air wheels, booster plugs, timers, covered with bamboo paper and painted with colored dopes. The models listed with motors are ready-to-fly and include propeller and batteries. Gas models sent express charges collect.

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Christie Batlas
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hidden artillery. He can make maps and draw contour pictures. He knows all the tricks of camouflage and the secrets disclosed by shadows.

He is a veritable jack-of-all-trades, and master of most.

At this point, it is natural that one will bring up the subject of the respective merits of various types of American observation planes as compared with those of foreign countries.

In general any comparison is either unfair or impossible because most observation planes are designed for the particular duty required or the geographical problems involved. For instance, there is no such thing as an observation plane in the British royal air force. There, they are known as army-cooperation or general purpose ships, and as such they are designed and equipped for a very wide range of duty. In Holland where they have an air force composed of many splendid types, no observation squadrons are listed. Again we find the army-cooperation and general purpose categories. In Italy they use the terms land or naval reconnaissance. Japan has reconnaissance squadrons. Russia combines reconnaissance and light bombing into one branch of the service, while France now uses the term intelligence squadron and designates the machines, reconnaissance planes.

Thus, we see that from the start, it would be almost impossible to classify the equipment. At the best we might make a comparison on their speeds, but we might lose sight of the equally important details as to vision, range, climb and service equipment. One type might be more maneuverable and be twenty miles an hour slower than another, and yet, were we to ask a representative group of observation crews to select the plane they would use under certain conditions, we might be startled at their choice.

It is the writer's opinion that the later model Douglas two-seaters are equal in all-around design to any like type in the world, and yet should a hypothetical mission be offered me, and were I given my choice of ships, I am afraid I should have a difficult time choosing from the Douglas O-46, the Hawker Hector, the Caproni Ca.134, or the Fokker C.10.

In considering the problem of observation aviation then, it is obvious that there is no set standard for equipment or type. What goes on the Spanish front probably would not fit into the requirements of the China-Japanese situation. As more than one military expert has stated, no two wars are alike and we go into the next as novices; for topography, climate, distances and general conditions change, and if plane "A" is ideal for a campaign staged in northern Africa, it might turn out to be a complete flop in southwestern Russia.

Another angle we must consider in observation is that of the coming argument which will arise in the next war concerning the relative value of the captive kite balloon and the autogiro plane.

The captive balloon was used as far back as the Civil War as a medium of indirect reconnaissance. It was used in the World War with great success, but even the most enthusiastic balloon booster will admit that the *sausage* is limited in its observation scope.

Observation made from the basket of a kite balloon has its advantages. Two men can work in comparative safety and comfort. They are in direct conversation or communication with the ground and owing to the stability of the balloon they can thoroughly cover an allotted area within a reasonable distance of their winch base.

But the balloon is an anchored device and cannot be moved quickly. It is a ponderous and bulky piece of equipment requiring a fair-sized ground crew to manipulate. Obeservation is limited to a comparatively small area, and only from an acute angle.

In contrast we have the possibility of the autogiro which many air powers are experimenting with for observation purposes. The autogiro costs slightly more than a kite balloon but can be handled by a comparatively small ground crew. It is mobile in the fullest sense and as such has the advantage over the gas bag, for it can always be moved quickly from any attack set up by the enemy.

The autogiro offers reasonable speed and a reasonable platform to work from, both from the point of view of visual observation and for the mounting of vertical cameras. It can be flown directly over the area to be inspected or observed and in that way avoids many of the mistakes balloon observers often make owing to deceiving shadows or deliberate camouflage. The autogiro can offer a fair degree of opposition because of its armament, but owing to its wide speed range it can practically hover over a target and give the observer a good chance to study a point in comparative ease.

One noted authority on the subject has gone so far as to state that the autogiro can maintain direct communication with the ground using an ordinary telephone system. A 3,000-foot cable of five-sixty-fourth-inch wire would weigh about twenty-five pounds, and with the hovering ability of the autogiro it should be possible for the plane to keep in direct telephone conversation with the ground under certain conditions. This situation could only be maintained, of course, where the area to be reconnoitered was close to the line dividing the two forces.

However, whether this system could be carried out under normal conditions, or whether it could be used only on rare occasions, has no point here; it is evident that, considering everything, the autogiro will eventually replace the kite balloon as an instrument of observation.

The Martin super Clipper built especially for Russia and shipped to that country from Floyd Bennett, where this photo was taken.

N.A.A. NEWS

(Continued from page 81)

thing over fourteen hours without stop. Al Hansen, Florida aviation directing official, and Karl E. Voelter and James Enrico were the N. A. A. officials who timed him off, while Theodore Epprecht, manager of Central Airport, Edward Walz, president of the Walz Corporation, checked him in at Camden at the end of the flight. The record, of course, is subject to official approval by the Federation Aeronautique Internationale, world sports aviation governing body of which N. A. A. is American representative, but undoubtedly will stand.

The distance actually covered as determined by the United States Coast and Geodetic Survey is ten hundred and fourteen statute miles.

MEMBERS OF N. A. A. EXECUTIVE COMMITTEE

Oliver L. Parks. Parks, president and manager of Parks Air College, has had an active and varied career, with aviation his chief interest. He left high school to join up with the marines and, after a year in the Indies, served with distinction for a year and a half with Smedley Butler's famous division in France. After the War he took his turn in college and university, and next got into the automobile industry. He learned to fly at Lambert Field, St. Louis, and founded Parks Air College in 1927, which has grown to be one of the finest aviation schools the world over—a real university of the air.

In addition to being a member of the N. A. A. executive committee, Parks is also the association's governor for Illinois.

James E. Webb. Flier, soldier, lawyer—Jim Webb, one of the most dynamic figures in American aviation, is with the Sperry Gyroscope Corporation, manufacturers of a long list of instruments and nagivational devices, many of which are for use on aircraft.

Webb is a graduate of the University of North Carolina and the George Washington University Law School, holding membership in the District of Columbia Bar. He received his flying training at the Navy Flight Training School at Pensacola and was commissioned in the United States Marine Corps Reserve. For a year he flew with the marine's crack outfit at Quantico. Once back in civil life, he continued his service flying with enthusiasm; helped organize and commanded the highly efficient Marine Squadron VO-3MR, based at Washington, D. C. Webb now holds the rank of captain.

Webb has held many important posts with N. A. A. besides his present membership on the executive board.

BEECH-CRAFTSMANSHIP

(Continued from page 28)

was adopted because it gives inherent stability under conditions approaching a stall. Since the center of lift of the lower wing is in front of the center of gravity of the airplane, and since the lower wing is designed to stall first, the ship will not permit the pilot to stall it completely except when a violent maneuver such as a whipstall is performed.

As a stall is approached, the lower wing stalls and loses its lift, and because it is in front of the center of gravity of the plane, the nose is dropped until the airplane is approximately level. The lower wing then recovers from the stall and again develops lift and the nose is raised back to a position approximately thirty or forty degrees above the horizon. The lower wing again stalls and drops the nose, and this oscillation, like that of a hobby horse on rockers, continues indefinitely as long as the pilot tries to keep the airplane in a stalled position. The upper wing never approaches a stall, and because the ailerons are located on the upper wing, complete lateral control is available at all times.

The Beechcraft biplane can actually be turned around apparently in a few lengths, with the turn indicator hard over against the peg, at the same time that it is in a fully stalled condition and oscillating along its longitudinal axis, without any tendency to fall out of the turn in a spin. Because the upper wing is unstalled at all times, and because the center of gravity is below the upper wing, a Beechcraft possesses pendulous stability during a stall. This is a very desirable feature under conditions of stalled flight, but is not particularly desirable during cruising flight. Its elimination during cruising flights makes the Beechcraft unusually responsive to the slightest touch on the controls. The average pilot flies it habitually without using the rudder pedals except for take-offs and landings, and a vertically banked turn can be perfectly made by using the ailerons and elevators only.

Another reason for the adoption of the negative stagger was the economy in the structure which resulted. The lower wing being in front makes it possible to attach the landing-gear fittings directly to the wing fittings for the lower wings. The flying wire fittings also are attached at the same point. These loads are carried on a heat-treated alloy-steel structure which is greatly overstrength. Because the struc-

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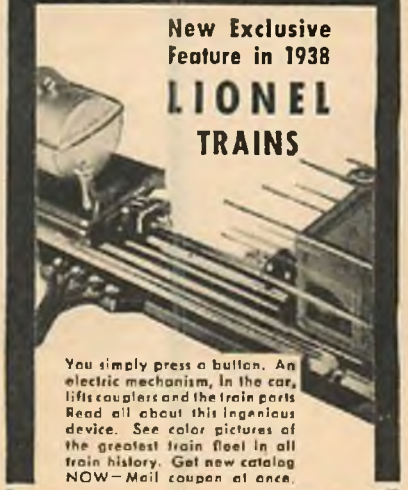

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ture does not have to be duplicated for the wings and for the landing gear, a considerable saving in weight is effected.

Another advantage of the negative stagger is the flat bottom which is produced on the airplane. This flat bottom makes belly landings entirely feasible. Beechcrafts have been landed at air meets and air races with their wheels retracted day after day without the slightest difficulty and without any damage to the airplane structure, with only the addition of a propeller brake and small skids. Many Beechcraft owners have found use for this feature when they were faced with forced landings caused by weather or other circumstances beyond their control. Ordinarily the damage to the airplane, even in fairly rough country, amounts to only a few hundred dollars, and there is no known case of a belly landing which involved injury to the occupants. Incidentally, army pilots have now adopted the same philosophy and consider that a belly landing is much safer than a wheel landing if the condition of the field is unknown to the pilot or is doubtful.

North American NJ-1, Navy training ship.

Beechcraft biplanes have been equipped with engines ranging from two hundred and twenty-five horsepower to seven hundred and fifty horsepower, and have had cruising speeds from one hundred and sixty-six miles to two hundred and twenty-five miles per hour.

An addition to the biplane group was made early in 1937, when the Beechcraft all-metal, twin-engined monoplane was licensed and made available to the public. This new model instantly became successful, and units are now serving in the "gold country" of Canada, in the Caribbean Islands, in the Philippines, and in the United States. They are licensed for operation on wheels, skis, or floats, and each type has outstanding performance. Like the biplanes, the new monoplanes are designed to possess an extremely large range of speed.

One of the chief fundamentals of the design of all Beechcrafts is the provision of ample wing area, and as a consequence wing loadings are low and landing speeds are exceptionally slow. While flaps are used on all models, they are of a conservative type and do not possess tricky characteristics which might make the ships difficult to handle. In order to insure stability at slow speeds, the wings of the Model 18 Beechcraft are built with a warp, or twist, which produces a gradually increased "wash-out" along the wing until a three-and-a-half degree maximum is reached at the tips. The Model 18 Beechcraft was the first all-metal airplane to be constructed with wings of this type, although others have adopted the method recently. It has proven to be an extremely successful way of building a wing which possesses exceptional stability at low speeds.

Beechcrafts also have proved that it is not necessary to cut down wing areas in order to attain high speeds. Standard-production-model Beechcrafts have placed in the money in each Bendix Trophy Race during the past three years. One standard four-hundred-and-fifty horsepower Beechcraft took first place in 1936 against a field of commercial transports and special racing planes; a five-hundred-and-twenty-five horsepower Beechcraft took third place in 1937 against an exclusive field of military pursuit planes and special racing planes; and two Beechcrafts took fourth and fifth in the 1938 Bendix Trophy Race against a field of pursuit ships and special racing planes. Inasmuch as the Bendix Trophy Races are open to any type of airplane powered with any type of engine, these results are quite conclusive.

Another aim of the twin-motored Beechcraft design was provision for operation from very imperfect and rough fields. The landing gear was designed to exceed considerably the requirements of the navy for aircraft-carrier planes.

Some of the owners of Beechcrafts use them for interesting purposes. One retracted his wheels and mounted his four-hundred-and-fifty horsepower ship on floats. As a pleasure trip he chose a jaunt around the world. He went across Canada into Alaska, over the Bering Sea, down the Siberian coast into Manchukuo. At that point the government officials objected to his flying along the coast over fortified regions, so he merely removed the floats and extended the landing gear (which had been in place all the time) and proceeded the rest of the way around the world to England, using his wheel landing gear in a normal manner. One large sheep rancher in Australia uses his Beechcraft to go to outlying stations and lands it wherever there is a bare spot on the ground. Another owner employs his to carry machinery to his mine in Sonora, Mexico, and to bring gold out to the United States. His field is an eighteen-hundred-foot-long "postage stamp" located at an altitude of almost six thousand feet, and surrounded by high mountains.

The moving picture entitled "Too Hot to Handle" features a Beechcraft seaplane operating in the jungle. The ship which was used is regularly based at Panama, and the scenes actually were photographed in the jungles of Surinam (Netherlands Guiana). In one sequence the seaplane towed a heavy native canoe for almost two and a half hours at high speed before the scene was completed to the satisfaction of the director.

The Philippine Air Corps recently purchased a twin-engined Beechcraft for photographic mapping work over the dense jungles. As an example of the danger of a forced landing, it was stated by officials that these jungles are almost impenetrable and that it required the labor of a hundred men for an entire week to cut a path four feet wide and a quarter of a mile long. Even if the survivors of a jungle crash were uninjured, such a landing would be one that they could not "walk away from."

In the United States, Beechcrafts are used exclusively in the Airplane Charter Division of O. J. Whitney, Inc., of New York City. The business of nonscheduled operations, incidentally, is an extensive one, and pilots are called upon to carry out widely varied assignments. In addition to such things as furnishing de luxe transportation to races or seasonal resorts, distributing leaflets and flying advertising banners, they scatter cremated human remains from aloft, drop packages on board ships already outward bound, enable belated passengers to reach boats they have missed, fly serums and transport persons requiring immediate or special medical attention.

Recently the Whitney company was contacted on the feasibility of bringing to New York from Sheridan, Wyoming, two stretcher cases, a couple badly injured in an automobile accident. A twin-motored Beechcraft was sent out and brought the patients back to New York in ten hours and forty minutes.

"Urgent" transportation, a field which the Whitney people have greatly helped develop, is an important adjunct of the flying industry, and one which the regular air lines often must forgo. For instance, radium on air lines carrying mail is prohibited by the post-office department, due to its damaging effect when kept in the vicinity of certain other classes of merchandise, thus leaving a definite need for air charter in emergency. This need is reflected in a number of other instances as well.

WACO "N"

(Continued from page 60)

sections shown. A compass is needed to do a good job. Cement the two rear disks together and carve the base-relief cylinders in the front face, then cement the two undercut rings on. Assemble the back ring to the front assembly with $\frac{1}{16}$" spacers, and when dry cover with $\frac{1}{32}$" sheet. Let dry again and sand to

Grumman Navy fighter.

the finished shape. The push rods are rounded bamboo. The nose plug (crankcase) must fit snugly in the hole and should have a $\frac{1}{16}$" aluminum-tube shaft bearing. Carve the propeller and finish the nose-prop assembly.

WINGS

The wings are of the simplest design and should be assembled completely on the left original and facsimile right drawings. Line up all parts in their proper positions with the aid of pins and blocks, and then apply cement to every joint. Instead of building the ailerons separately, wait until the top wing assemblies are dry, and then slot the ribs for the aileron spars and cement them in with the extra-short ribs. #20 copper wire makes suitable hinges. The flaps are simulated with black ink on the finish.

TAIL SURFACES

Make an opposite sketch for the stabilizer and build it as a unit with a continuous spar. The simplest method of assembling the tail frames is to use plain stock as designated. Block up the edges to center with the rib stock. When the assemblies are dry, it is much easier to shape the ribs and edges by sanding than to assemble odd, pre-shaped parts so small.

LANDING GEAR

Pin the wing frames to the fuselage and check the line-up carefully. The dihedral in the top wings should be approximately $\frac{5}{8}$", and the corresponding angle in the lower ones. Fit and fix the wing struts on with an ample amount of cement. Right and left struts should match.

The finished landing-gear parts are cemented and pegged together with bamboo, then cemented to the model. The front strut cements to "A"; the main rear struts are slotted and cemented to the first ribs and spars of the lower wing, as per detail. Check the line-up before the cement dries. Do not cement the diagonal braces on until after covering. Apply several heavy coats of cement to the main struts and pants. Pin the first rib of each wing to the fuselage with two bamboo pins about ¼" long, from the inside of the wing frames, and cement to the ribs only, so the ribs can now be removed and replaced "as was" after covering. Do not be alarmed when it is found that the top and bottom wings are fastened together with the struts, and that the landing gear is still attached. That is the way it should be, and should be covered "as is."

ASSEMBLY

Cover the remainder of the model. If a tissue color scheme is to be followed, cover all wood parts with the desired colors, otherwise the colored dopes will do, and only the exposed frames need to be covered.

Reassemble the model with cement and spray the tissue with water. After a light coat of clear dope, carefully apply the tissue fillets on the tail surfaces and wing roots and continue the color scheme if colored dope is desired. The colors are optional. The windshield and suggested detail are the last items to be added.

FLYING

Power the model with four strands of ⅛" flat rubber and make the adjustment flights in tall grass until an R. O. G. flight seems justified. More power may be added after the novelty of the long take-off on the tricycle landing gear wears off.

MATERIAL LIST

Miscellaneous	Blocks
2 oz. cement	1 ⅝x1x1½"
1 oz. clear dope	2 ⅝x1x2½"
(1 oz. each of colored dope optional)	1 ¼x½x5"
	1 1x1¼x6"
Sheet	
2 sheets tissue	2 $\frac{1}{32}$x2x18"
2 loz. shredded bamboo	2 $\frac{1}{16}$x2x18"
	1 ⅛x2x18"
12' #12 music wire	1 ¼x1¼x2½"
6" #20 copper wire	**Strips**
	4 $\frac{1}{16}$x$\frac{1}{16}$x18"
3 1½" air wheels	1 $\frac{1}{16}$x⅛x18"
4x6" sheet celluloid	2 $\frac{1}{16}$x$\frac{3}{16}$x18"
	12 $\frac{3}{32}$x$\frac{3}{32}$x18"
assorted friction washers	2 ⅛x⅛x18"
	4 ⅛x$\frac{3}{16}$x18"
48" ⅛" flat rubber	3 ⅛x¼x18"
	1 ¼x½x12"

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REPRESENTATIVE: JACK E. FONTAINE

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A screwdriver is the only tool you need. Average assembly time 30 minutes.
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Motor rear device, imitation gas motor, big 36" wingspan; metal cylinder flanges, detachable wing, finished propeller, plenty of rubber. Complete kit, $1.00; postage 10c, or buy from dealer. Send 6c for catalog to COMET, 2509 Cermak Rd., Chicago, Dept. T12

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WIND IN HIS WHISKERS

(Continued from page 21)

But did Mr. Hand appreciate what I was offering him? He did not. He says young man, in the first place your proposition is ridiculous, and in the second place I have no interest in airplanes and I never will buy one as long as I live. They're dangerous things made only for the purpose of killing people. But I have something else that I will tell you so that you will understand without question what I want you to know.

You are a worthless, scatterbrained idiot who has no sense of business and never will make a good business man. You never will amount to anything and I forbid you to see my daughter any more. Furthermore, you admit yourself that your airplane is unsafe in its present condition and I, as a public-spirited citizen of Maywood, will take steps at once to see that you carry no more of my friends and neighbors in your death trap. And lastly, the sooner you get out of Maywood, the better I will be suited. Good night.

Well, mom, you talk about bad news. Here I'd gone into a flat spin over Jane Hand and her old man now tries to kick me out of town just because I offer to let him in on a good thing.

Jane didn't know just how bad things were for me until she sneaked out that night and met me downtown. We drove out to the airport in her car and I told her then about everything. She started to cry and that was when I was sure I loved her. She said she thought her father was very mean and that she had told him what she thought of him and that he had then called up the inspector's headquarters in Washington, which must have cost him plenty of dough, and had told them there was an old haywire crate flying passengers from their town and risking the lives of their citizens.

Right then Jane got rough with the old man and told him he was the meanest man in the world and he told her she was the dumbest dame and if she insisted on continuing to see me, she must never darken his front porch again. So Jane says, you see, Windy, you've got to marry me whether you want to or not. Gee, mom, as if I didn't want to, but me being in a tough spot, what could I do with a wife? So she says she'll stay with her aunt on the other side of town and that it would do her old man good to worry and maybe he'd repent.

But I guess he didn't do much repenting that night because next morning while I was standing by the old crate out at the airport, a car drove up with a Federal license. It was the inspector and he took one look at my pride and joy and said that I couldn't fly any more passengers in her and the best thing I could do would be to junk her.

I didn't know what to do, mom, so I wandered down to the garage man who was still sort of enthused about aviation and I told him all about it. Seems he didn't like Horace Hand so much himself. You see, he'd run one of the little laundries that Hand had put out of business with his cut prices and machine work. I found out, too, that old man Hand had been slipping a little. Folks in Maywood didn't like the way their clothes were coming back kind of gray instead of white and smelling of chlorine that they'd bleached them with and they also didn't like the idea of getting the clothes back on a Thursday when they'd been picked up on Monday. The hotels had sent their business to other towns.

The garage man, who had taken up selling cars after he'd gone broke in the laundry business, said anyway, I could take my plane apart and store it in an old blacksmith shop that his father used to run. Well, mom, we went over to look at the shop and right then dawn dawned and I do mean dawned. You see, there wasn't any windows left in the old blacksmith shop and the holes had been covered with pieces of cheesecloth. The garage man had tried to raise chickens there for a while after his father had died, but that hadn't worked out and the cloth was all loose and blowing back and forth in the windows.

Right there, mom, was when opportunity nudged me. I thought of an idea and I called Jane from the garage and she met me and I told her I was going to start up a laundry in town myself. She near dropped dead and I thought I was going to lose a wife before I got her.

You see, mom, I figured how I could run a one-day laundry. I'd get the use of the blacksmith shop, get it all cleaned out and whitewashed with stuff the garage man said he'd back me to since it was his property, and we'd get all the wash women in town that old man Hand had put out of business and they could bring over their washing machines and we'd collect in the morning, get the clothes washed and then hang them up on clotheslines stretched back and forth in the whitewashed blacksmith shop. While the wash women went home to eat their lunch, I'd start up the old airplane engine that I'd have in the back end and the wind from the propeller would have the clothes dry by the time the women came back. They'd iron the clothes in the afternoon and I'd deliver them in the evening. Pretty swell, eh, mom?

Well, to top that off, one of the local printers who had some time on his hands and a lot of cheap paper that he didn't know what to do with said he'd stake me to ten thousand handbills. That was to be the advertising.

Next day I dumped those handbills over Maywood and a couple of other towns nearby. I'm inclosing one, mom.

WINDY'S WONDER WASH WORKS
Clothes gathered before nine a.m. delivered before seven p.m. the same day.
Lowest Prices
Hand work
Our new secret process enables us to render this super-service
Send your clothes to
WINDY'S WONDER WASH WORKS
and
"YOUR DIRT IS GONE WITH THE WIND"

That last crack was our slogan. Hot stuff, hey, mom? Old man Hand had one of the bills and was at the airport waiting for me to land when I got back. He wanted to know everything. Was he burning up! He was like a live lobster in a stew. Of course, I wouldn't tell him anything, except that I had invented a very secret process that had anything stumped in the laundry business.

Gee, mom, it would have done your heart good to see all the old wash women in town looking happy to get jobs again. I swore every one of them to keep the secret of our process, then I brought in the fuselage—that's the body of the plane—and moved it up at the back door where we could get a good draft sailing through.

Old man Hand was up snooping around but we fixed him. The garage man was having a swell time by now, getting even with Hand for what he'd done to him, and he found a lot of wire he'd forgotten about and we built a wire fence around the blacksmith shop and hooked up an old Ford electric coil to it. Boy, that worked like a charm. I'll never forget the next day when we were turning out our first day's wash —it was a Monday and we were being swamped with dirty clothes. Old man Hand came blustering up and demanded to see what was going on. Jane was helping me inside and she saw her old man coming and got scared, but I turned the switch that put the juice through the wires and went out to meet the old man.

I pointed to a sign I'd painted which said no trespassing and told him he couldn't come in. He came to the gate and said he was coming and no upstart was going to stop him. I told him if he laid a hand on the fence he'd be

sorry, but he didn't believe me—not until after he'd touched it. Boy, was he sorry! So help me, it knocked him right on his ear. He was so scared he picked himself up and scrammed without another word.

Mom, if I do say so myself, we turned out some mighty nice washings and the business doubled the second week. Everybody was satisfied and we were going swell. Old man Hand didn't show up again, and the following week-end Jane said she was going home and see if he was all right. She'd been kind of worrying about him.

Monday morning when I got back with the second-hand truck we'd borrowed from the garage man loaded to the gills with laundry, Jane was there waiting for me. After we got the women washing the clothes, she got me over in a corner.

Windy, she says, I'm worried about dad. We've cut into his business pretty badly. He wants to see you. Well, I didn't have anything much to do until the washing was finished, so I drove the truck up to his office in the big machinery steam laundry and got out. He was waiting for me but honest, mom, I felt sorry for him myself. I guess he'd lost about ten pounds and he wasn't looking any too happy.

Windy, he says, I was wrong about you. You're the best business man in this town. Anyone who can beat Horace Hand at his own game deserves plenty of credit.

I'm going to make you an offer. You've got something in this new laundry method and I want to be in on it. I've got to be in on it. You're ruining my business. Besides, I need younger blood in the business. We'll go in together. You'll be in charge of getting new business on the outside. Together, we'll make these laundries that have been cutting in on me sit up and take notice.

You mean, I says, that we just sort of merge and that's all? I expected him to say yes, but he didn't. He says, I've decided to make you this proposition. I'll give you five thousand dollars for a half interest in your process and take you in as a full partner at seventy-five dollars a week. We'll each draw the same salary. What do you say?

I wanted to yell yes, mom, but you know me. I couldn't let down the wash women who had been so happy with their jobs back, so I says there's a couple of things that you'll have to put in the contract besides that, Mr. Hand. First, you'll have to agree in writing to keep on hiring all the employees that I've got now. Then you got to consent to my marrying Jane.

The contract will be drawn to suit you, Windy, he says and about marrying Jane, that is one thing I would insist upon. I'm proud to have my daughter marry you, Windy. But there's one other thing that I forgot to mention. All of the equipment which you own in connection with your laundry goes into the deal.

I could hardly keep from laughing as I said that was okay with me. And mom, I'm sending a hundred bucks with this letter and there'll be another hundred every month. You won't have to work any more.

So now as I'm writing this, Jane and I are flying for our honeymoon in Bermuda on one of those Pan-American Clipper ships and I'm wondering what the old man's face looks like now that he's found out all the equipment he bought is a junk airplane that I tried to sell him a while ago for one-tenth the price. Boy, I'll bet there's wind in his whiskers. Your loving son,

WINDY.

MODEL MATTERS

(Continued from page 71)

however, for the limited amounts required in modeling. For example, Frank recently came across a block of insulating material that is lighter than balsa, yet fireproof—a natural for use around the motor of a gas job. Then there are all thicknesses of sheet aluminum available, all of top quality. Also, he has found two packages of some kind of balsa insulating material. It is lightweight, yet pliable enough to make splendid fairings. There were sheets of copper that had been treated to hold their shape despite the thin gauge. He used these for cowlings.

* * *

N. Y. C. CLUBS FORM ASSOCIATION. An association of model airplane clubs in the metropolitan area of New York City was formed recently at a meeting of representatives from eleven leading clubs. Irwin S. Polk, director of the Metropolitan Model League, and active in the promotion of model aviation for some twelve years, was elected chairman.

The purpose of the association is to guide and direct the aeronautical interest and activities of the air-minded youth in the metropolitan area through proper leadership and supervision of model competition. Due to the rapidly mounting interest in the building of larger models powered with gas engines, it has become necessary for further organization to meet new conditions. Under the guidance of the National Aeronautical Association, and in compliance with the Bureau of Air Commerce, a licensing system for powered models has been set up for establishing self-supervision by model builders, adherence to fair and reasonable operation rules, with provision of penalty for violators.

A PIMPLE-FACED OUTCAST AT 17?

Read how to help protect the skin against intestinal poisons

Are you shunned and pitied because of repulsive-looking hickies? Then why not get right at a common cause of this trouble—and take steps *now* to help overcome it?

Between the ages of 13 and 25, final growth takes place. This is often accompanied by disturbances throughout the body. The skin may become oversensitive. Waste poisons from the intestines often get into the blood, then ugly pimples may break out.

Many young people help solve this problem—simply by eating Fleischmann's Yeast. Each cake of this famous fresh food helps eliminate intestinal waste poisons from your body *before* they can get into the blood stream . . . and so gives these pimples a chance to clear up. Don't run the risk of permanent scars by neglecting such pimples. Start eating Fleischmann's Yeast now—3 cakes daily—one cake ½ hour before meals. Begin now!

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(3) The Sky Racer (Navy Racer, Wing Area 680 sq. inches).
(4) The Amphibian Clipper (Land gear retracts, Wing Area 710 sq. inches).

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Yalecraft Model Airplanes (Formerly of Hollywood)
Box 14, Canoga Park, Calif. Telephone 4141.

THE 1938 WAKEFIELD TROPHY WINNER

(Continued from page 59)

length of fifteen inches. The outline of the wing tip is built up from 1/8" sheet balsa. Where the thickness required is greater than 1/8", laminate two thicknesses of sheet balsa. A strip of silk is doped to the outline of each wing tip to strengthen the balsa tip.

The wing is covered with bamboo paper, water-doped and treated with two coats of Fokker red dope. It is sanded with fine sandpaper (rubbing chordwise) after each coat of dope.

TAIL

Construction follows closely that of the wing. The front spar is built up from 1/32" sheet balsa. The rear spar is solid—1/16 x 1/32". The tips of the elevator are built the same as the wing tips.

A typical section of the rudder—marked AA—is shown in the drawing. The rear portion of the rudder is 1/16" sheet balsa secured to the main rudder with two short pieces of soft copper wire. The main spar of the rudder is 1/16" outside diameter aluminum tubing. This spar runs through the fuselage from the top portion of the rudder to the bottom part.

Both rudder and elevator are covered with ordinary outdoor variety tissue. Follow with water doping and one coat of dope. Use glider polish on the flexible portion of the rudder. The elevator and rudder are both mounted rigidly to the rear end of the fuselage. Balsa fillets are cemented between the rudder and elevator at the point where they join the fuselage. The elevator is set at zero degrees incidence. That is, the bottom surface is directly in line with the center line of the fuselage. Check the alignment carefully while assembling.

LANDING GEAR

This landing gear has the least resistance of any type we've yet seen on any model. There is a minimum of exposed parts because of the fuselage shape. This landing gear is partly responsible for the slow sinking speed of the Clodhopper II. Impartial observers credit this model with the slowest sinking speed of any model entered in the 1937 national meet.

Landing-gear supports consist of one piece of 1/16" diameter wire bent to shape and secured to former #6. The wheels are 1/16" thick, cut from three-ply balsa veneer. Aluminum tubes are inserted through the wheels to provide smooth running. Conical pieces of pine wood are cemented to both sides of the wheel to support this aluminum tubing. Pronged aluminum disks may be substituted.

MOTOR

Sixteen strands of 1/4 x 1/30" brown rubber were used. It is lubricated with prepared rubber lubricant. The motor was forty-nine inches long. Rubber tubing was used on all wire fittings which contacted the rubber. This is important. The rubber strands will be cut by an unprotected wire fitting.

COLORING

U. S. army #4 yellow was used on the fuselage and elevator. Fokker red was used on the wing, rudder, propeller and wheels. Complete and ready to fly, the model weighed 8.4 ounces.

INSIDE THE CHAMOIS POUCH

(Continued from page 50)

dropped and he dove to get a ship that was on young Sandy's tail. His fingers jammed hard on his trips as the single-seater came under his sights. White streamers and lead pumped into the fleeing ship. It rolled off on one wing; the nose dropped; flames began to lick back from the engine housing. The pilot shot out of the cockpit, turning slowly over and over as he dropped beside the whirling plane.

When Bill saw that the two remaining single-seaters were peeling off in terrific power dives to run away, he nosed the amphibian down and opened a window beside him. He rocked the amphibian violently to get their attention, then pointed downward to the long stretch of brown stubble that was below.

Bill was standing on the ground with the little chamois pouch he had taken from the pocket of Sarnoff when he saw Eden Aird, the Englishman, climb out of the tail of the Charger with Shorty. Red Gleason and Bev Bates and young Sandy were standing beside him when Shorty and Aird joined them.

"That was nice work, Aird," Bill said as he shook his hand.

"It had to be," Aird said.

"What's in this thing?" Bill asked him, tossing the little pouch up in his hand. "I mean, what is written on those little rolls of paper?"

"You got it from Sarnoff!" Aird said, his eyes shining with delight. "Where is he?"

"He's dead," Bill said. "Shorty got both Sarnoff and Cianelli with his first burst of fire. He missed me by a fraction of an inch. What information is written on those rolls?" he repeated.

"You'll be safer if you don't know, Barnes," Aird said. "But I'll tell you this: We've known for the past year that two of the powers of Europe were banding together to strike at us. But we didn't know when. We've fought espionage with counter-espionage. We learned that they were sending information out of England and France about the resources of both nations—locations of armies and navy bases, where ammunition is stored, just how many men we could throw into the field, and where we would throw them, what we would do if they struck, information about our air defenses. We knew they were learning these things and we managed to intercept the stuff when it was sent direct to their own countries. So they evolved a scheme by which they could send information to America by press dispatches and radio, in code. They were putting all the information together to be sent in one batch to the Imperator before he made his address to the Assembly today. The question was how to get it here safely. That is why you and Mortimer were called into the scheme. We only learned of their idea after it was too late."

"Who sent that airplane carrier out to shoot us down?" Bill snapped.

"That's another thing you had best not know," Aird said. "They were only supposed to stop you, not shoot you down. But let me ask a question—how did you find out you were carrying a fake string of pearls?"

"Young Houdini here discovered that," Bill said, pointing at Sandy. "I didn't know anything about it until we were on our way over. He stole the real string out of the pocket of the man who switched them before we started."

"You'd better turn that pouch over to me," Aird said. "And then you'd better get out of here as fast as you can. You won't be safe until you get back home. I'll ride as far as Cannes with you if I can. I still have some business to finish with Drusille Sarnoff. She's—"

"She's in it too?" Bill asked quickly.

"Up to her neck," Aird said. "If you get out fast and get clear you'll never hear anything more about it. These things are hushed up. The public will never know how close the Imperator came to declaring war this afternoon. And that within twenty-four hours. I knew it. That's why I went to your men to get help for us all."

"Hey, Bill," young Sandy said, "who will get that real string of pearls?"

"Drusille Sarnoff," Aird said. "But she won't be able to wear them where she's going."

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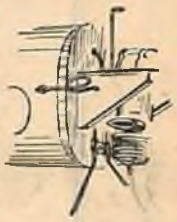

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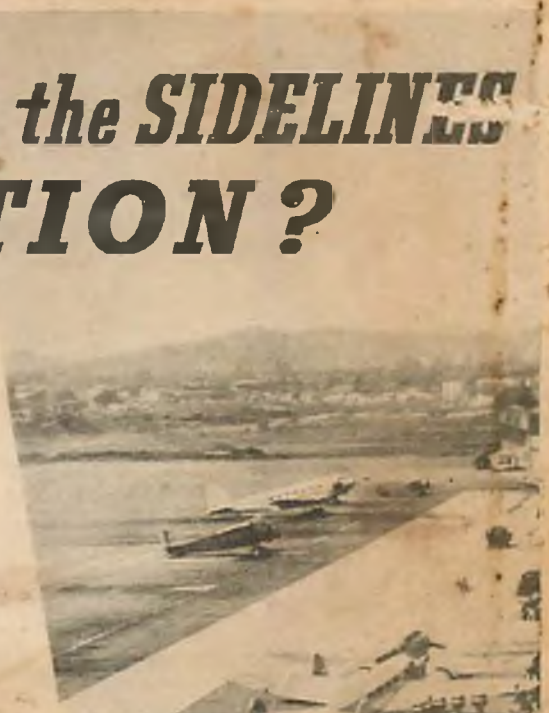

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