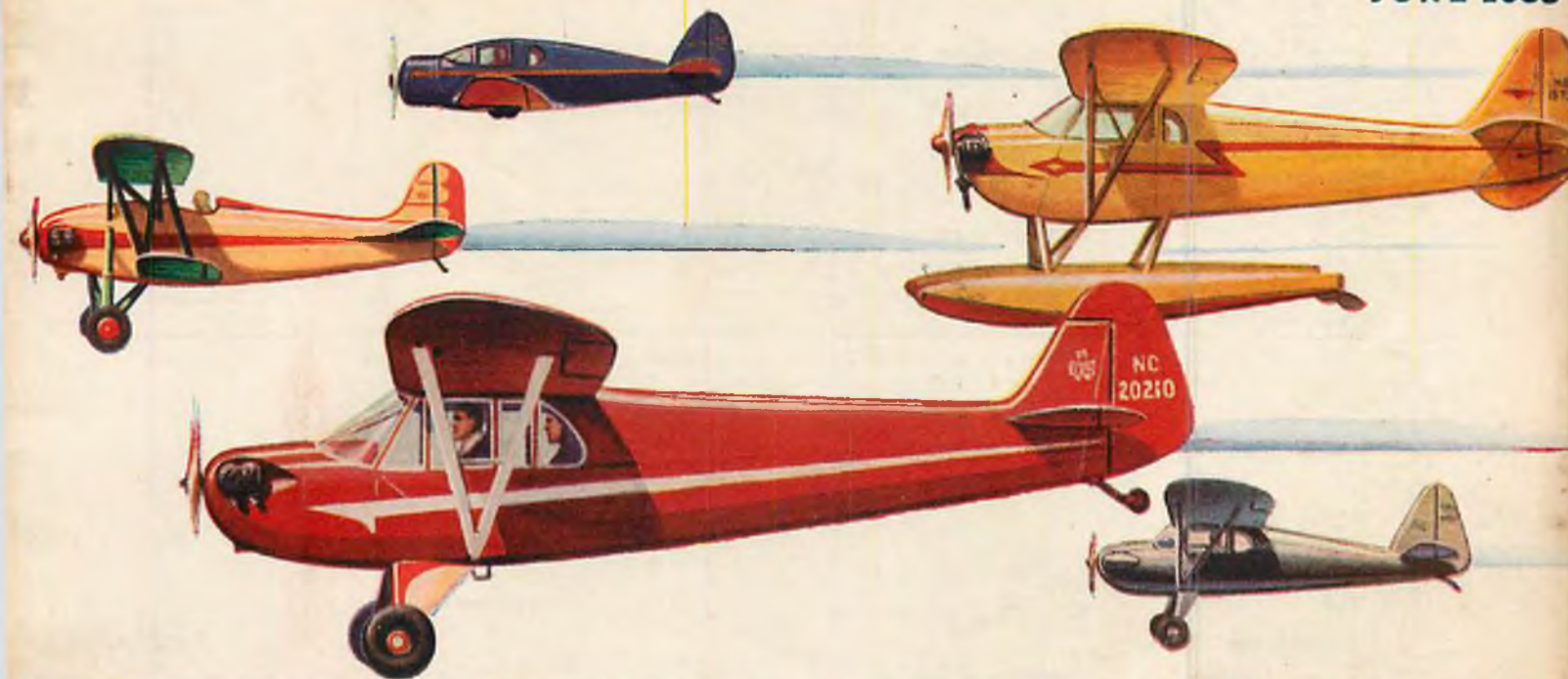


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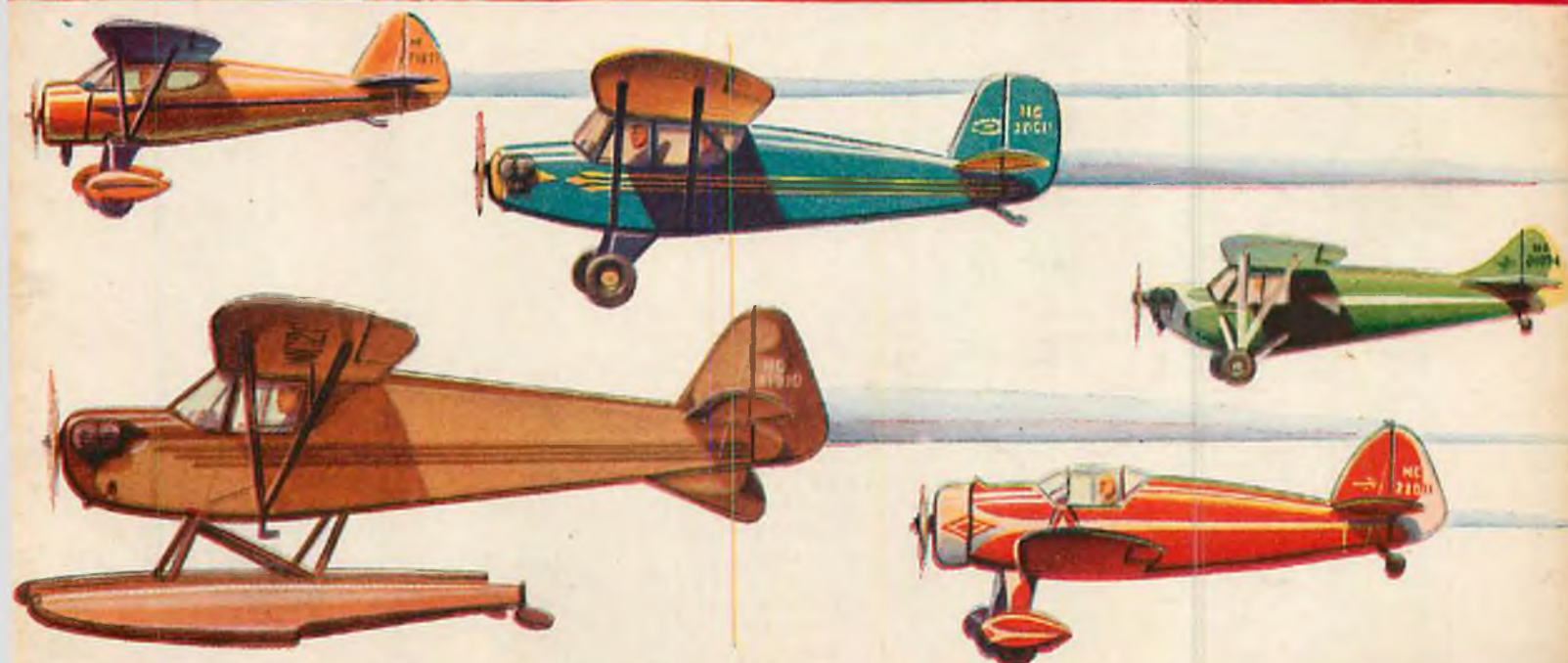
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JUNE 1938



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June, 1938

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HOW'S THAT FOR A LAIRD TRANSPORT MODEL? WHAT HAVE YOU BEEN DOING LATELY, BILL? BUILT ANY MORE MODELS?

NO, JERRY. I DECIDED AVIATION WAS A BUSINESS TO MAKE MONEY IN--NOT TO FOOL AROUND WITH. I'M WORKING AT THE AIRPORT NOW. COME ON OUT.

YOU'RE IN AVIATION NOW? AND A LICENSED PILOT ALREADY? HOW COME?

LET'S TAKE A HOP. I'LL TELL YOU WHILE WE WARM UP THE MOTOR.

YOU HAD TO GIVE UP YOUR JOB, DIDN'T YOU, TO GET AVIATION TRAINING?

I DID NOT. WALTER HINTON TRAINED ME AT HOME. THEN I GOT A GROUND JOB AT THIS AIRPORT AND GOT MY FLYING INSTRUCTIONS AT A VERY LOW COST. HINTON TELLS YOU ALL ABOUT HOW TO GET INTO AVIATION IN A FREE BOOK HE'S PUBLISHED.

GEE--THIS IS GREAT. I'LL SEND FOR WALTER HINTON'S BOOK TONIGHT AND LEARN HOW HE TRAINS MEN FOR AVIATION.

WHAT A COURSE. HINTON GIVES ME THE DOPE ON MOTORS, AIR PLANE DESIGN--AIRPORT MANAGEMENT--GIVES ME THE GROUND TRAINING FOR MORE THAN FORTY DIFFERENT TYPES OF AVIATION JOBS. AND HE'S HAD MORE THAN EIGHTEEN YEARS EXPERIENCE TRAINING MEN FOR AVIATION. I'M GOING TO START TRAINING RIGHT NOW.

THIS SHIP HANDLES BETTER THAN EVER SINCE YOU'VE BEEN SERVICING IT.

THANKS BILL. HINTON CERTAINLY KNOWS HIS STUFF. I'M TAKING FLYING LESSONS NOW. I'LL SOLO NEXT WEEK.

I'M SO GLAD YOU GOT INTO AVIATION. WITH THAT NEW JOB AS PILOT FOR THE AIRLINE WE CAN GET MARRIED RIGHT AWAY.

AND THERE'S PLENTY MORE AHEAD FOR US IN AVIATION, DEAR. IT CERTAINLY IS THE INDUSTRY FOR AMBITIOUS WIDE-AWAKE MEN.

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What's Your Question?

By CLYDE PANGBORN

Wing Commander



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.

Question: Is the German plane D. O. X. still in service? E. S., Reidsville, N. C.

Answer: No, the D. O. X. is not in service any more. It is in a museum in Germany.

Question: What are the chances of an airplane instrument inspector and maintenance man of getting a job? How are they selected and what is their salary? J. F. A., Waitsburg, Wash.

Answer: It should not be hard for an airplane instrument inspector and maintenance man to obtain a job with any of the big aircraft factories like Boeing in Seattle, Wash. He should write to the factory stating his education, experience, age, whether he is a citizen of the United States. They, in turn, will either ask him to come over,

Rudy Arnold

inasmuch as a number of factories give tests before they hire a man, or will send him an application to fill out.

Question: Did Major Al Williams ever have a Curtiss Gulfhawk, and if so, when? Where can I get in touch with Howard Hughes? H. McC., Rexton, N. B., Canada.

Answer: Major Al Williams did have a Curtiss Gulfhawk two years ago. Howard Hughes is very hard to get in touch with because he is always traveling. I think you can reach him at the Grand Central Air Terminal, Glendale, Cal.

Question: Which country has the fastest seaplane in the world and what is its speed? What is the fastest landplane, and its speed? J. M., Norfolk, Virginia.

Answer: The fastest seaplane in the

world is also the fastest airplane—in fact, it's the fastest vehicle of any kind in which man has ever ridden. It's the Macchi-Castoldi MC-72, a twin-float monoplane, powered by two Fiat AS-6 liquid-cooled in-line engines mounted in tandem and producing 2,800 h.p., which won the world speed record for Italy in 1934 by traveling over a 3-kilometer course (1.86 miles) at the rate of 440.67 m.p.h.

The fastest landplane is the Messerschmidt, with Daimler-Benz engine, with which a pilot named Wurster won a new record last November for Germany, of 379.16 m.p.h. For over two years the United States had held the landplane record at 352.46 m.p.h., set by Howard Hughes in his Twin-Wasp-Jr.-powered racer.

Question: What is meant by a three-bank or four-bank airplane engine? Where can I get a fair amount of general flying information at a reasonable cost? D. T., Menasha, Wisconsin.

Answer: The word "bank" is most commonly used nowadays in designating "two-bank" or double-row radial engines, those in which there is a second circle of cylinders set behind the first. In this case, therefore, the intended meaning of three-bank and four-bank would be clear. But as a matter of fact I know of no such engines. There have been rumors of a three-bank Bristol engine, but the problem of air-cooling the rear sets in a three- or four-bank arrangement would give plenty of trouble, in my opinion, to anybody who attempted it.

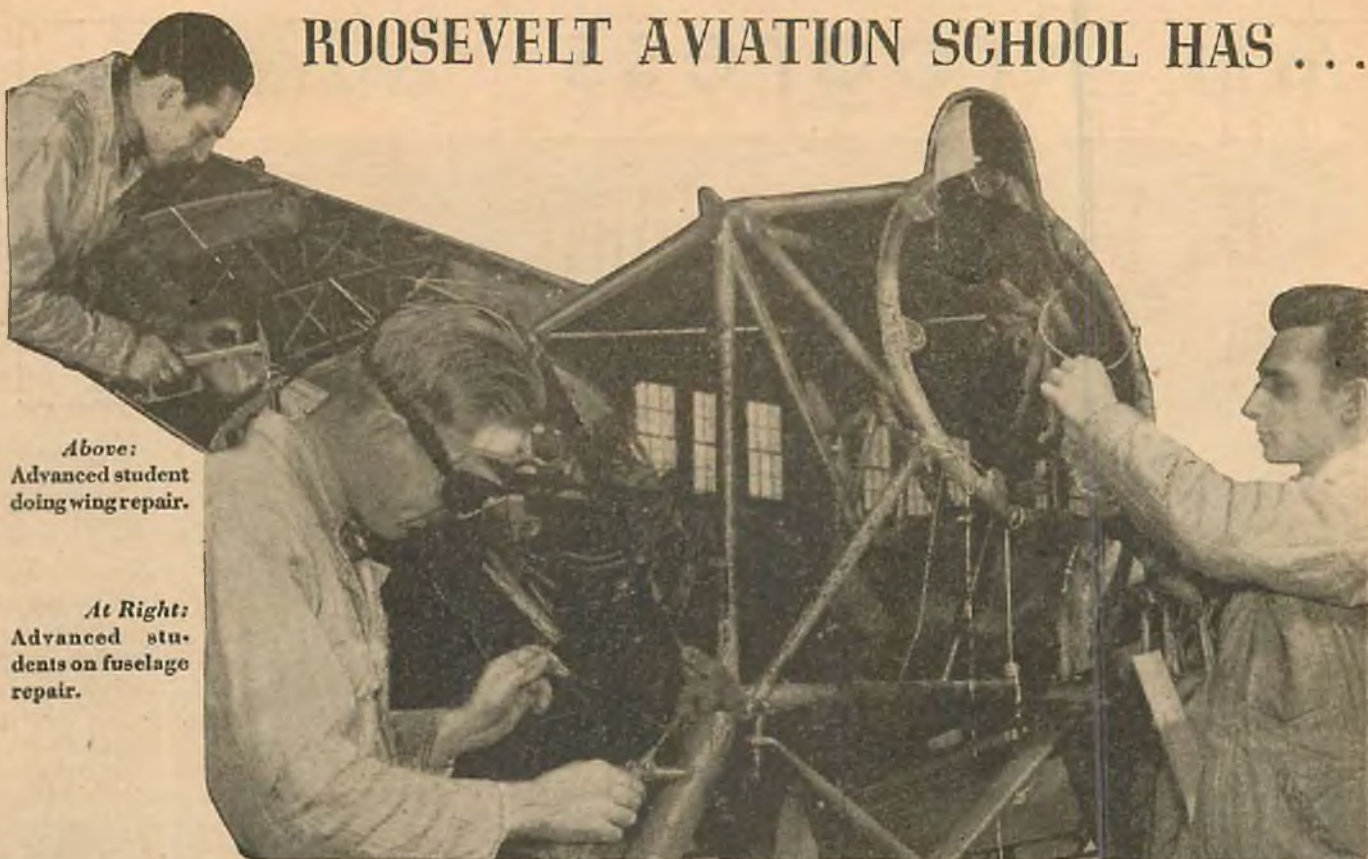
Maybe you have heard these terms used in referring to in-line engines, in which straight rows of cylinders are set up along the crankshaft. There can be several of these rows arranged at different angles. They were more common in the past, when all kinds of arrangements were tried such as the three-bank W or "broad-arrow" and the four-bank X arrangements, than they are today.

(Turn to page 93)



An interesting close-up of the Waco N, showing the flaps installed on both upper and lower wings and the novel three-wheeled landing gear.

ROOSEVELT AVIATION SCHOOL HAS ...



Above:
Advanced student
doing wing repair.

At Right:
Advanced stu-
dents on fuselage
repair.

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So it doesn't matter *which* course of training you take at Roosevelt, you get *thorough* training. You are *fitted* for the work you want to do. You leave this school with *confidence* in your ability to handle your job. That confidence is *invaluable* to your future. With it, you can win *success*. Without it, you face *failure*.

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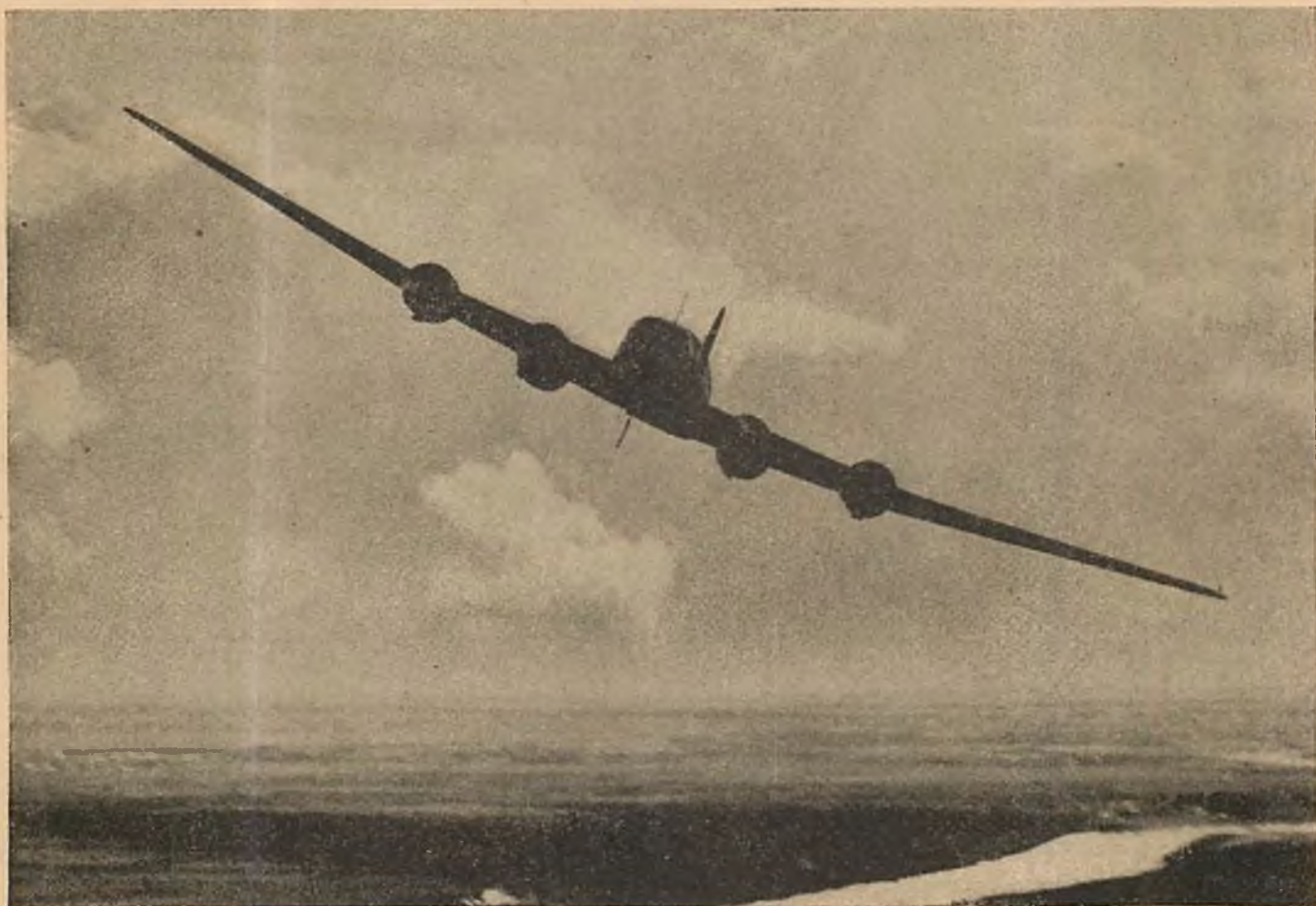
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A. T. June, 1938

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Air Progress

A SUMMARY OF
AVIATION NEWS



The four-engined era has arrived. Representative of German contribution to aviation progress is the four-motored Focke-Wulf "Condor," an exceptionally beautiful machine.

TRANSPORT

Figures on commercial air-line business for the year of 1936 are finally reaching the adding-up point, and operators all over the country are at last realizing the extent of the growth of their business. For instance, 491,744,000 passenger-miles were flown by American airliners that year, showing an increase of 150 per cent over 1933. This total was more than twice that of the combined passenger mileage of the seventeen European countries on which statistics are available. Germany stood second to the United States with 76,744,000 passenger-miles which was an increase of 221 per cent over the 1933 figures.

During 1937 the number of airplanes manufactured in the United States increased 25 per cent over the previous year. There were 3,773 planes built last year, and 2,289 were for domestic civil use, 858 were for delivery to military establishments, and 626 for export.

Other figures on the 1937 production provide some interesting facts. There were ten lighter-than-air craft built that year, and thirty-one gliders. One concern which produced but two planes in 1936 produced 428 in 1937. Another increased its production of 171 in 1936 to 302 in 1937. One hundred companies or individuals were engaged in manufacturing airplanes for domestic civil use; sixteen companies produced fourteen or more

planes each, or 76 per cent of the total, and four companies made parts for nineteen airplanes.

Preparations have recently been started by a newly formed Japanese company to operate the air service over the Shanghai-Haichow-Tientsin-Pekin route, which was formerly served by the China National Aviation Corporation, a Chinese-American company. The route will eventually be extended to Tokyo.

Air France has just taken delivery on the new Air-Couzinet airliner which has a cruising speed of 208 m.p.h. on 74 per cent of power. The ship uses two Hispano-Suiza 9V engines rated at 650 h.p. each.

South African Airways has just ordered two more Junkers of the Grosser Dessauer type.

The popularity of the American Link Trainer abroad can be understood when it is reported that no less than twenty-six are in regular use in Great Britain. A great number have been purchased by the Air Ministry.

We learn from good authority that the new German zeppelin which may go into service this summer on transatlantic passenger trips may be named the *America*. The only obstacle in the way at present appears to be whether *America* shall be spelled with a "c" or the Teutonic "k."

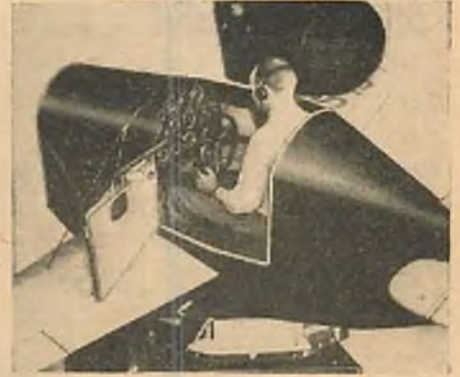
Trans-Canada Air Lines have ordered six new Lockheed 14H monoplanes, which have an (Turn to page 87)

CALIFORNIA FLYERS

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It's obvious, isn't it, that Los Angeles is the best place to learn and earn—for here more planes are manufactured than in any other place in the world—here more planes are flying—and here the planes of tomorrow are planned, built and tested. Here in the world's aviation center, California Flyers is the foremost Flying and Mechanical School. Consider the outstanding advantages offered. *Lower-cost training; strategic location, finer equipment and more thorough, all around training.* Decide today to get the California Flyers' plan for your success in aviation.



Typical of the modern training equipment at California Flyers, is this latest Type C Link Blind Flying Trainer, one of the few in the United States.



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Motion picture actor Brian Aberne and his plane. Mr. Aberne is one of the many notables whose planes are hangared at California Flyers.



Instrument technician student at work here in California Flyers latest and most modernly equipped instrument laboratory.



Time to rest and play at California Flyers beautiful mile-square airport campus, under all-year sunshine, America's finest flying weather.



Lunch at the airport cafe—food and living is cheaper and better in Los Angeles according to official figures—your training costs you less.



Plenty to talk over here at California Flyers on the U. S. Bureau of Air Commerce Testing Field—where the planes of tomorrow are tested.



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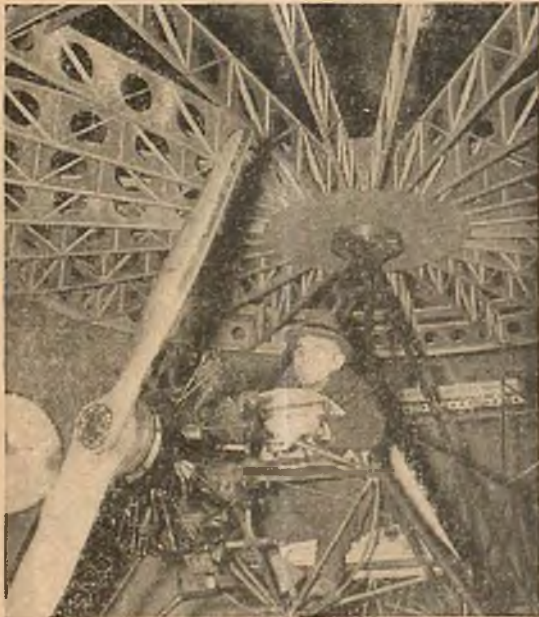
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This Winged World

International



DISC-ROTOR plane being built in Washington, D. C., claims safety in the hands of a novice. Disc is locked during flight, but rotates like autogyro vanes when landing.



Wide World



Aring

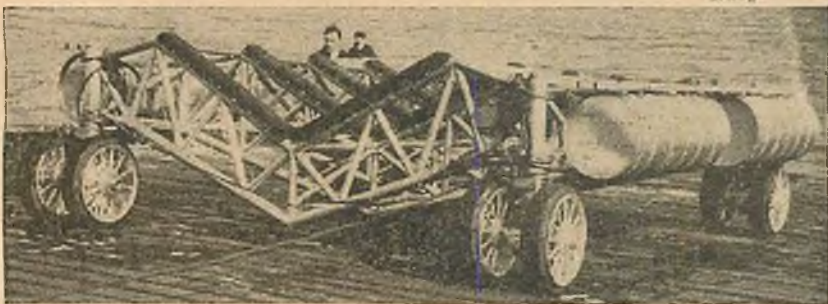
LEFT—A line-up of British Hawker Hurricanes, one of which averaged 408.75 m.p.h. on a 400-mile night flight on instruments. Same trip was flown in formation at a 300 m.p.h. average! Above—Special helmet and mouthpiece that enable the leader of the squadron to issue directions in flight to each Hurricane.



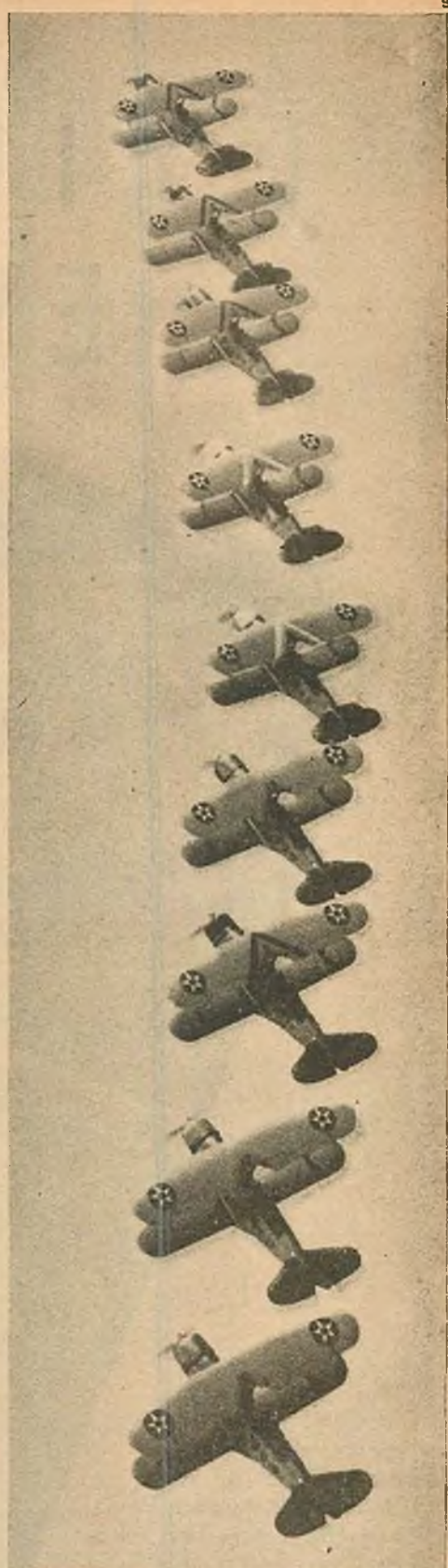
Krug Arnold

RUSSIA'S giant Martin flying boat. This interesting close-up contrasts the mammoth bulk of the machine with the dwarfed ground crew. The ship was disassembled and crated at Floyd Bennett Field for shipment to Russia. Below—The special 6,000-pound beaching gear cost \$1 a pound to build.

Rudy Arnold



Arme



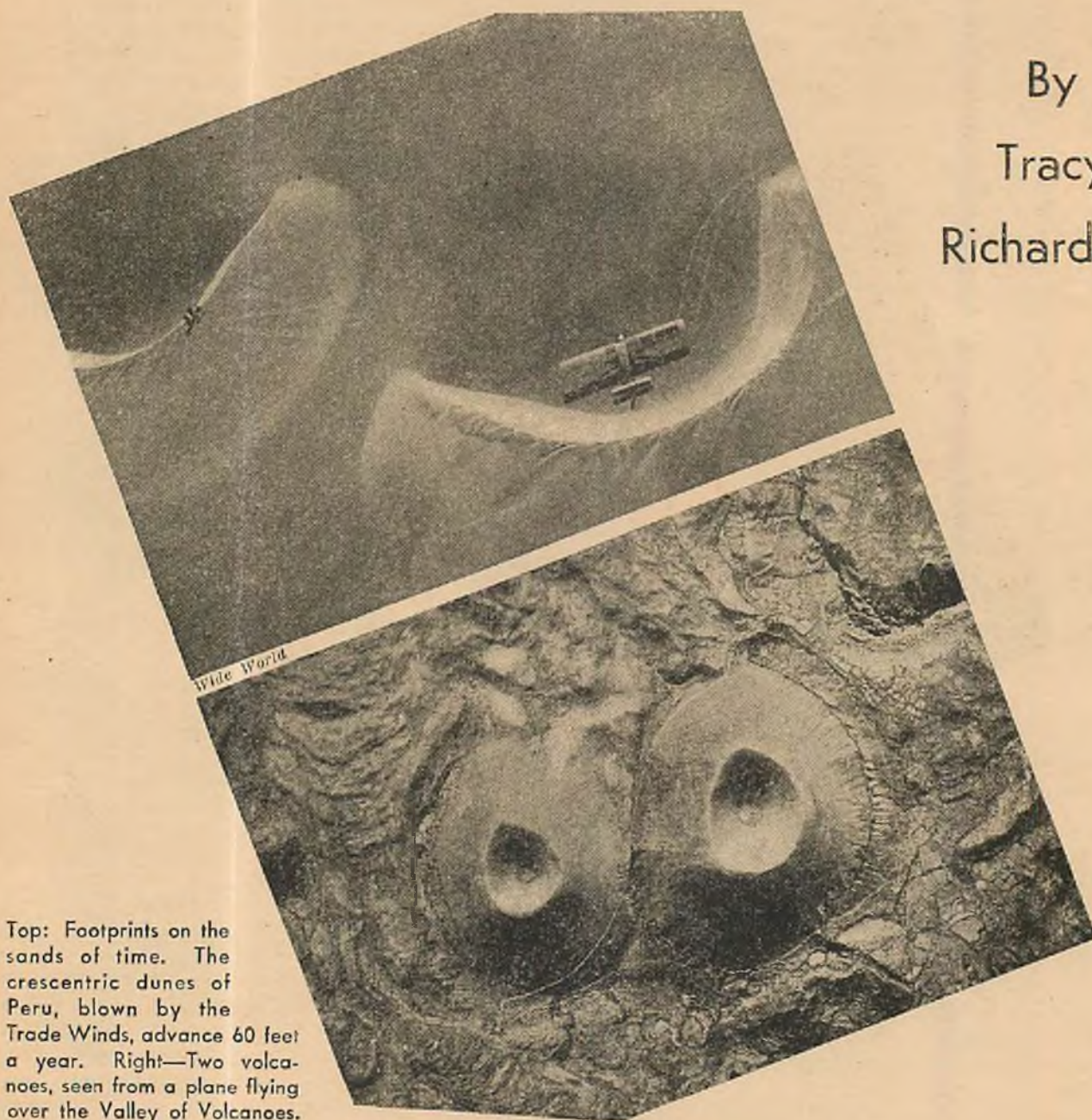
International

SCOUT-BOMBERS from the carrier "Enterprise" flying in close formation. The ships are SBC-3s, many of which have been built by Curtiss for the Navy

FRENCH airliner of high performance is to be put in service by Air France on their Paris-Far East run. The large "F" painted on the top of the fuselage leads to the speculation that the French fear mistaken identity on the part of fighting planes operating on wartime basis.

FLYING ISN'T EVERYTHING

By
Tracy
Richardson



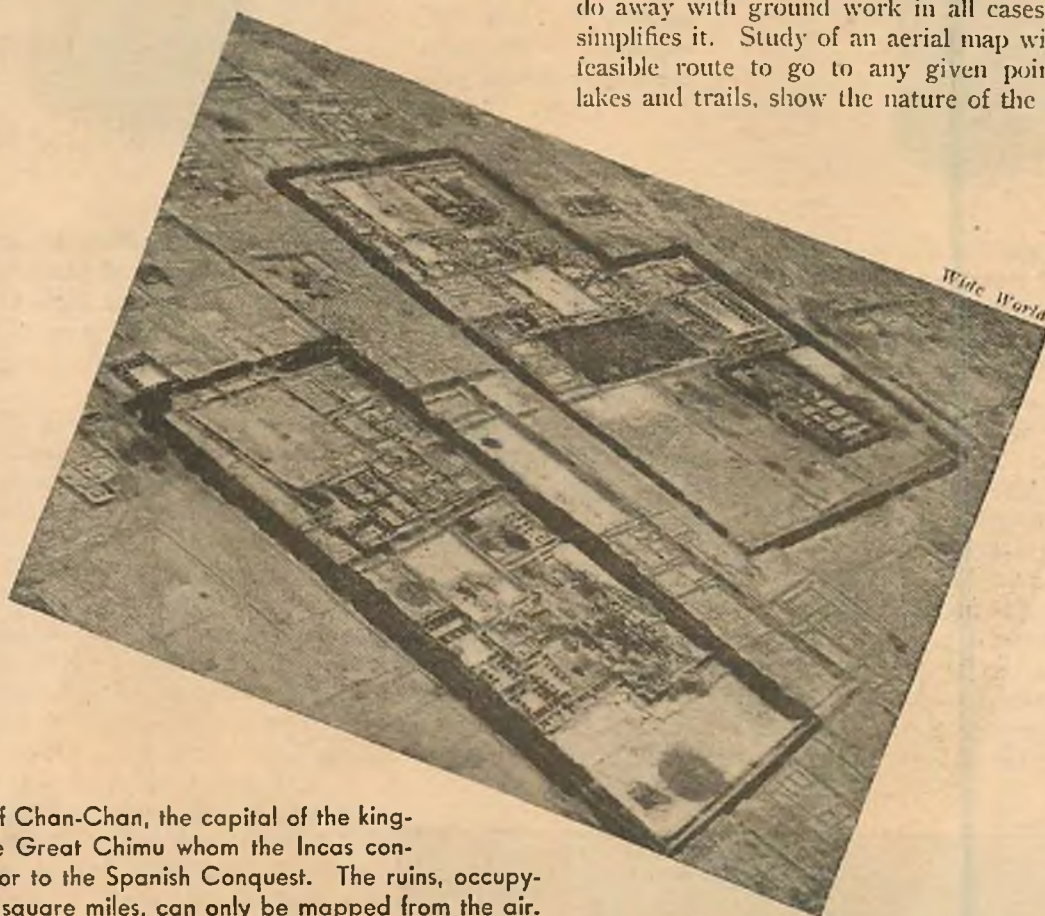
Top: Footprints on the sands of time. The crescentric dunes of Peru, blown by the Trade Winds, advance 60 feet a year. Right—Two volcanoes, seen from a plane flying over the Valley of Volcanoes.

IN the year 1923 I was in charge of a party that spent eight months exploring and mapping the Department of Peten, the northernmost state of the republic of Guatemala. Our mules stuck in the mud and died. Their flesh rotted from sores caused by beef worms. Much of the time we were without even the luxury of tobacco, but there were never any fast days for the mosquitoes or ticks; they were with us always. For the most part we lived on red beans, rice and fresh meat, and as a rule it was monkey meat. We did the job but came out fever-ridden and looking like draped scarecrows.

Several years later, in four days of perfect flying weather, I photographed most of that country from an airplane and found out things about it that no journey on land would ever reveal. I located lakes with the aerial camera that even the native Indians professed to never having seen or heard of. With the mosaic map we made, we definitely established the location of anticlines that offered good possibilities for oil. Anticlines which all our research on land had never positively defined.

I am what is known—for want of a better name—as an exploration engineer. It's really a composite sort of

By the airplane, man has been enabled to penetrate the uncharted regions of the earth. In this absorbing tale of adventure the success of aerial exploration is shown to be dependent on more than a dashing pilot.



The ruins of Chan-Chan, the capital of the kingdom of the Great Chimú whom the Incas conquered prior to the Spanish Conquest. The ruins, occupying eleven square miles, can only be mapped from the air.

job. First of all you must have the instincts of a prospector who has the faith to dig down under moss and leaves to locate a hidden vein of ore whose location has been revealed by a long-hidden map stored away in the family trunk in the attic. Then you've got to be a good hunter to keep the camp supplied with fresh meat. You have to know how to cruise a timber tract, and be engineer enough to figure out the transportation problems, as well as a good enough cartographer to map accurately the country you explore, locating rivers and trails, mountains, valleys and the like.

Then you've got to be a darned good photographer, for you have to record everything you see on films for permanent record, and it's no amateur's job developing films out in the jungle where the humidity will spoil them within twenty-four hours and the water you use to dissolve the chemicals is often eighty degrees warm and probably full of mud and wiggletails.

That's my job. I'm not bragging, just explaining. There are a thousand and one other things you should know, such as how to throw a diamond hitch to hold a pack on a half-pint-sized mule, and how to administer any kind of first aid.

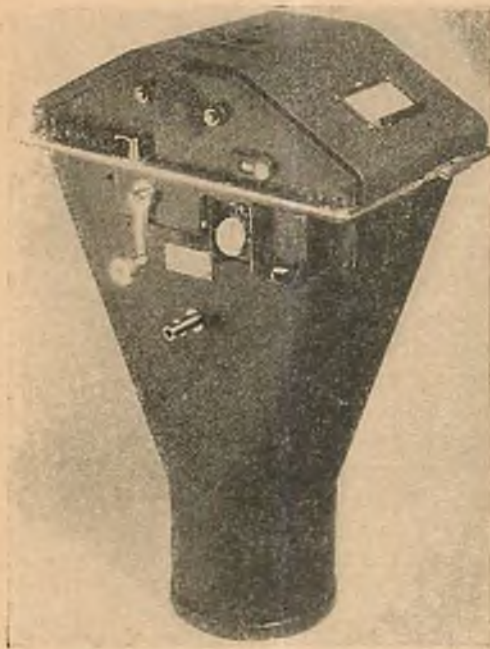
I've followed faint trails through tropical jungles to check the standing timber, much of it precious hardwoods that sell in this country by the pound. I've traveled the rivers in dugout canoes, as long as eighty feet, chopped or burned out of a single giant tree, checking the amount of gold to be found in the sand and gravel bars.

To-day it is possible to cover, and map accurately, more territory in a single day with an airplane and an aerial camera than could be explored and mapped by old-time methods in months. Aerial photography does not do away with ground work in all cases, but it certainly simplifies it. Study of an aerial map will show the most feasible route to go to any given point, locate rivers, lakes and trails, show the nature of the country covered,

height of the timber and mountains; and in some cases where there is not too much timber, a fair knowledge of the country's geology can be determined. This development of aerial photography has not all come about in a day.

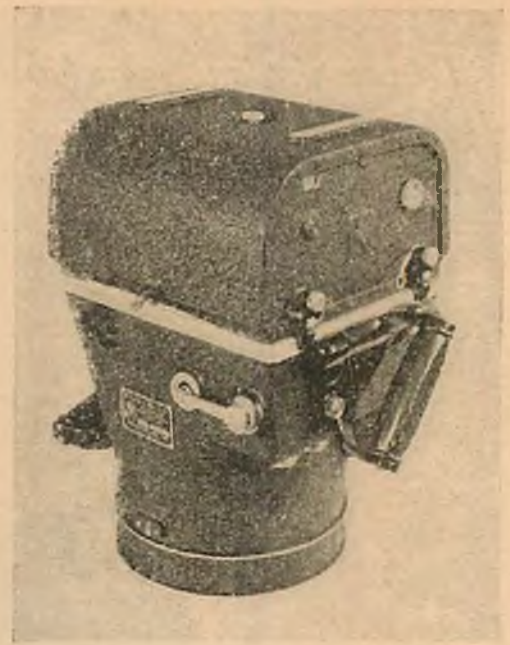
The World War was responsible for the first growing pains of aerial photography. At the beginning of the conflict cameras were used to photograph enemy positions. By making frequent check they could tell where the enemy had opened up new trenches, if supplies were being concentrated at any specific point, indicating a drive. To a certain extent they were valuable in locating artillery positions.

The cameras used were for the most part ordinary four-by-five plate cameras dressed up in a box so the wind would not blow in the bellows and cut off the view. In a regular photographic ship they were fitted to shoot through the bottom of the fuselage, but on the fast—as war-time speed was counted—scout planes, they were



Left: Army K.7.A. semi-automatic camera for military reconnaissance. Designed for high altitude, it gives wide coverage. Film 9x18", lens 24".

Right: Fairchild recording camera: weight 35 pounds, 8 1/4" lens, 7x7" exposure. Works automatic from oblique position.



fastened to the outside of the fuselage. Many combat pilots developed their acrobatic skill through changing plates in these cameras. It had to be done blind, with one hand, against a hurricanelike blast of wind.

By the end of the war automatic cameras had been developed. Cameras that used large rolls of film, actuated by springs wound like a clock and timed to automatically roll the film and make a new exposure every so many seconds. The mechanism of these automatic cameras was set to correlate the height of the plane from the ground and its ground speed.

But it is since the World War that the greatest progress has been made in aerial photography. In Europe they have developed a camera so tiny it can be attached to the body of a homing pigeon and automatically make pictures as the bird flies over enemy territory toward its home cote. There are giant cameras that have been developed by both the military and commercial companies.

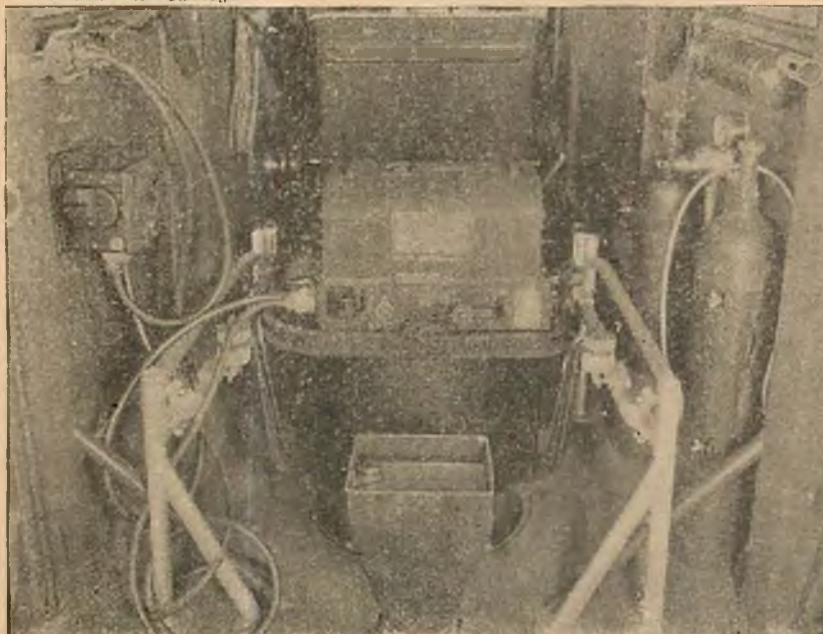
Some of them are so large that planes are actually built around them. Their lenses are so powerful they can make distinct photographs from as high as it is possible for the plane to fly. In theory at least they will make pictures of an object two hundred and fifty miles away.

The greatest advance in recent years in aerial photography has been in the development of special lenses and film, fast, sensitive film that permits the use of color screens on the lens. With these color screens the lens can penetrate the blue haze and fog that oftentimes hides the earth from the high-flying camera ship. Some of these new cameras have five or even ten separate lenses, synchronized to register one image on the film. These multiple-lens cameras register an image which, when viewed through special glasses, shows the object photographed in relief; trees, buildings and mountains appear in something approaching their natural perspective.

The actual making of aerial photographs is easy. By that I mean it is easy for the trained cameraman and pilot. In mapping, the territory to be photographed is first checked on the best ground maps available. The scale of the map desired is decided upon and is determined by the height the plane flies with relation to the focal length of the lens. They know almost to the foot the amount of subject that will be covered by one negative from a given height, how many trips back and forth will have to be made and the number of exposures that will be required. With these predetermined figures known, it is just a question of good photographic weather.

Elaborate laboratories on the ground do the rest. They develop the negatives, make the prints, taking great care to keep the tones as even as possible. These prints are then matched, measured carefully with instruments and cut, and the whole is assembled into a jig-saw map which is in turn rephoto- (Turn to page 78)

Fairchild Aerial Surveys



Installation of a Fairchild K-8 aerial camera in the floor of a survey plane.

Pictorial History of Man in the Air



1911- ON MARCH 11 EUGENE RENAUX WON THE MICHELIN GRAND PRIZE BY FLYING FROM ST. CLOUD TO PUY DE DOME, A TINY PLATEAU 150 YARDS SQUARE, BARELY MISSING A 4,500 FOOT GULF ON ONE SIDE AND THE MOUNTAIN ON THE OTHER.



1911- LIEUT. JEAN CONNEAU OF THE FRENCH ARMY, KNOWN AS "ANDRE BEAUMONT" TO THE FLYING WORLD, WINS THE GRAND PRIZE OF \$32,330 FOR THE EUROPEAN CIRCUIT RACE. THIS GREAT AIR RACE BEGAN IN PARIS BEFORE A RECORD CROWD OF OVER 700,000 SPECTATORS. THE RACE RAN FROM JUNE 18 TO JULY 7, AND ATTRACTED WORLD-WIDE ATTENTION.



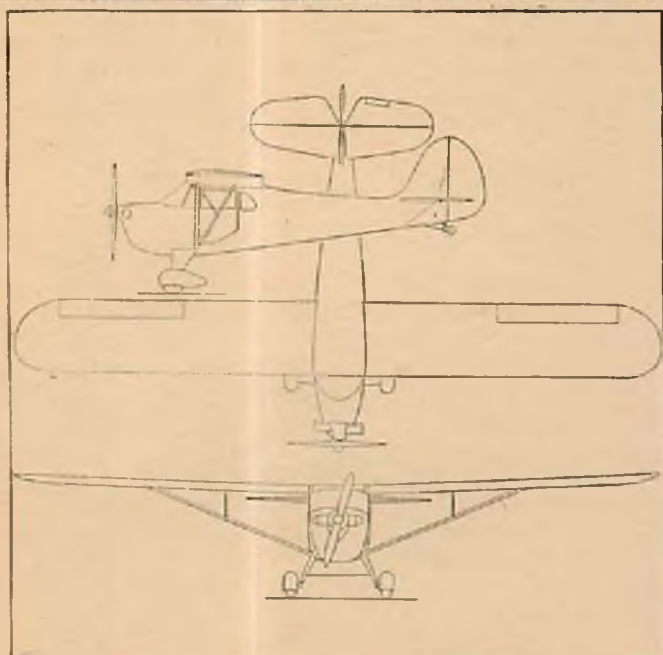
1911- UPON THE FIRST OF JULY OF THIS YEAR A NEW WORLD SPEED RECORD WAS SET BY CHARLES WEYMAN, THE AMERICAN PILOT, TO WIN THE THIRD GORDON BENNET CUP RACE. HIS AVERAGE FOR THE 94 MILES OF THE COURSE WAS 78.77 M.P.H., AN UNHEARD OF SPEED AT THAT TIME.

1911- JAMES VALENTINE, THE ONLY ENGLISHMAN TO FINISH IN THE GREAT CIRCUIT OF ENGLAND AIR RACE FROM JULY 22 TO JULY 26, THIS RACE WAS WON BY THE FRENCHMAN BEAUMONT IN 22 HOURS, 28 MINUTES AND 18 SECONDS FOR THE 1,010 MILES, WINNING FOR HIM THE FIRST PRIZE OF \$50,000.



1938 ANNUAL LIGHT PLANE SURVEY

*Ten pages devoted to the light plane industry—
Presenting drawings, photos and specifica-
tions of planes powered by 100 h.p. or less*



AERONCA KC

The basic Aeronca two-place high-wing monoplane is produced in three models differing only in power plant and landing gear. Model K is a landplane powered with the 40 h.p. Aeronca E-113C engine. Fitted with floats, it is designated KS. The third version is the KC powered with the Continental A-40-4, which also develops 40 h.p. The A-40-5, a variant of this engine featuring dual ignition, is also available.

The Aeronca LC, a two-place, low-wing cabin monoplane is produced by the same manufacturer. Powered with the 90 h.p. Warner, it is available with either wheels or floats.

Engine	Continental A-40-4
Span	36'
Length	20'7"
Height	6'7"
Gr. Weight	1,060 lbs.
Useful Load	450 lbs.
Pay Load	214 lbs.
Seating	2 side-by-side
Max. Speed	93 m.p.h.
Cruis. Speed	85 m.p.h.
Land. Speed	35 m.p.h.
Climb	450 ft./min.
Serv. Ceiling	12,000 ft.
Cruis. Range	250 mi.
Price	\$1,590
Terms	\$470 down, bal. 12 mo.
A.T.C.	655

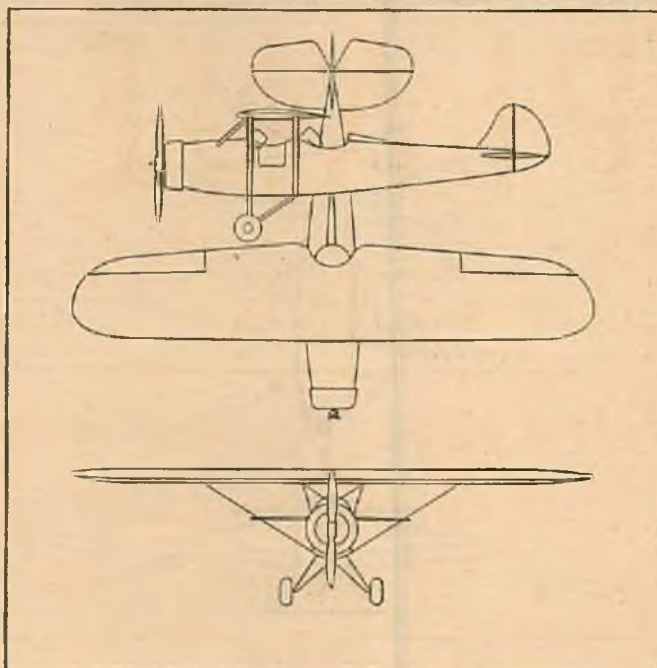
Manufacturer: Aeronautical Corp. of America,
Cincinnati, O.

AIR TRANSPORT METEOR

The Meteor is an externally braced, high-wing monoplane available in two models, both powered with the 100 h.p. Kinner K-5 air-cooled radial engine. The P-2 is equipped as a trainer and is slightly slower than the P-2-S touring model. Both feature twin open cockpits in tandem and dual controls. Construction is conventional with wood and fabric wings in three panels, center section containing 30-gallon fuel tank. Welded steel tube fuselage, faired with wood and covered with aluminum forward of the firewall and fabric aft.

Engine	Kinner K-5
Span	32'
Length	24'
Height	7'
Gr. Weight	1,750 lbs.
Useful Load	675 lbs.
Pay Load	
Seating	2 tandem
Max. Speed	135 m.p.h.
Cruis. Speed	110 m.p.h.
Land. Speed	42 m.p.h.
Climb	1,200 ft./min.
Serv. Ceiling	14,000 ft.
Cruis. Range	450 mi.
Price	
Terms	
A.T.C.	488

Manufacturer: Air Transport Manufacturing Co.,
Ltd., Glendale, Cal.

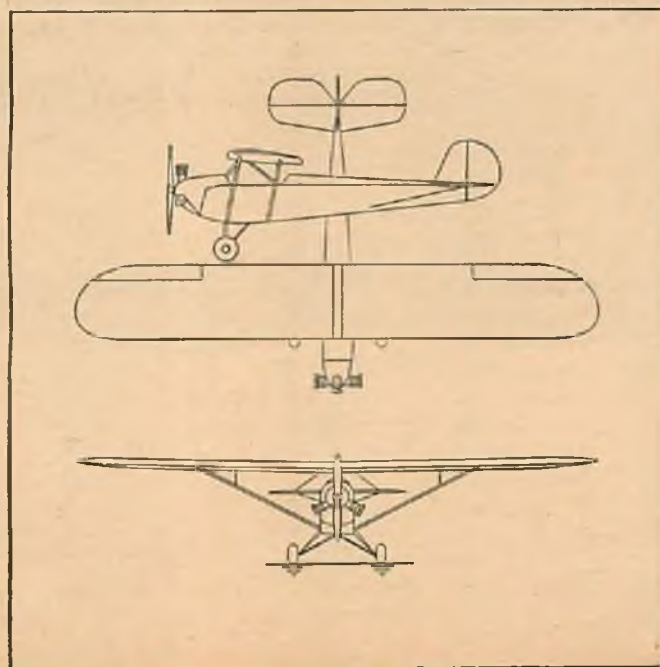


AMERICAN EAGLET

The 1938 Eaglet is substantially similar to last year's model. It is an externally braced, parasol monoplane powered with the Szekely SR3-0 engine. This is a three-cylinder, air-cooled radial developing 45 h.p. at 1,750 r.p.m. The wing is built in one piece and supported above the fuselage by inverted V cabane struts. Conventional two-spar, wood and fabric construction is used. The fuselage is a rectangular structure of welded steel tubing covered with fabric. A large open cockpit seats two in tandem. Dual controls are provided.

Engine	Szekely SR3-0
Span	34'4"
Length	21'7 1/4"
Height	8'
Gr. Weight	922 lbs.
Useful Load	413 lbs.
Pay Load	
Seating	2 tandem
Max. Speed	90 m.p.h.
Cruis. Speed	75 m.p.h.
Land. Speed	28 m.p.h.
Climb	450 ft./min.
Serv. Ceiling	14,500 ft.
Cruis. Range	250 mi.
Price	\$1,575
Terms	
A.T.C.	450

Manufacturer: American Eagle-Lincoln Aircraft
Corp., Kansas City, Mo.



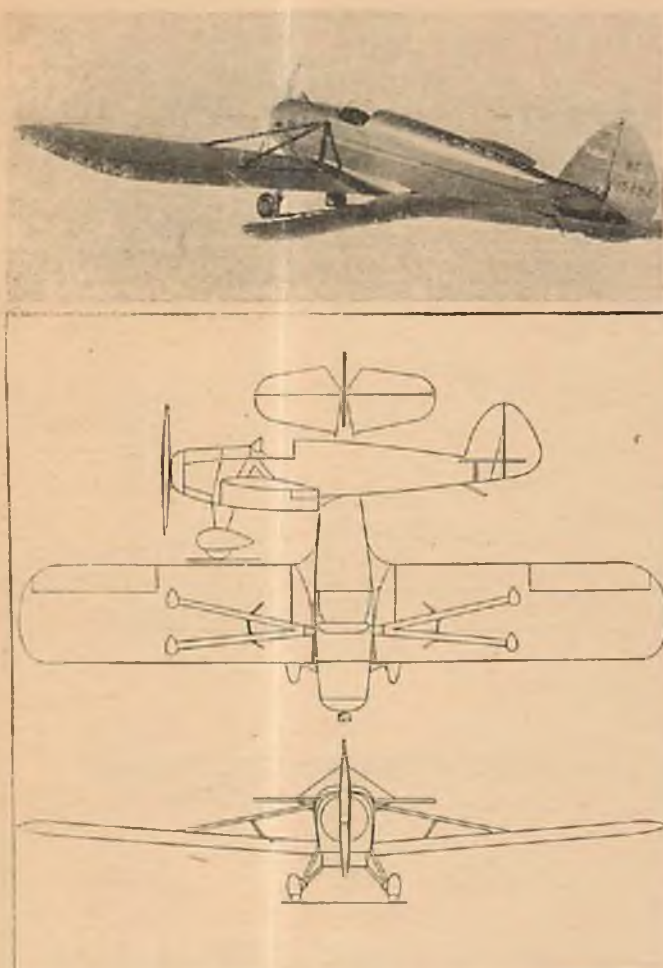
ARROW SPORT-F

One of the most successful of the automobile-engine-powered light planes. A converted Ford V-8 engine delivers 82 h.p. at 3,075 r.p.m. and is geared down to a propeller speed of 1,580 revs. The Sport-F is a side-by-side two-seater, low-wing monoplane and is available with either open cockpit or cabin enclosure. Dual wheel controls; baggage compartment behind seat; Hayes wheels and brakes, Goodrich tires and oleo shock-absorbers; navigation lights; Pyrene; first-aid kit.

A new experimental gull-wing model (G) with an improved V-8 engine and new-type cowling develops 90 h.p. and shows appreciably better performance.

Engine	Arrow V-8-F
Span	35'7"
Length	21'4"
Height	8'10"
Gr. Weight	1,675 lbs.
Useful Load	503 lbs.
Pay Load	198 lbs.
Seating	2 side-by-side
Max. Speed	100 m.p.h.
Cruis. Speed	95 m.p.h.
Land. Speed	45 m.p.h.
Climb	800 ft./min.
Serv. Ceiling	12,000 ft.
Cruis. Range	300 mi.
Price	\$1,500
Terms	
A.T.C.	613

Manufacturer: Arrow Aircraft Corp., Havelock, Neb.

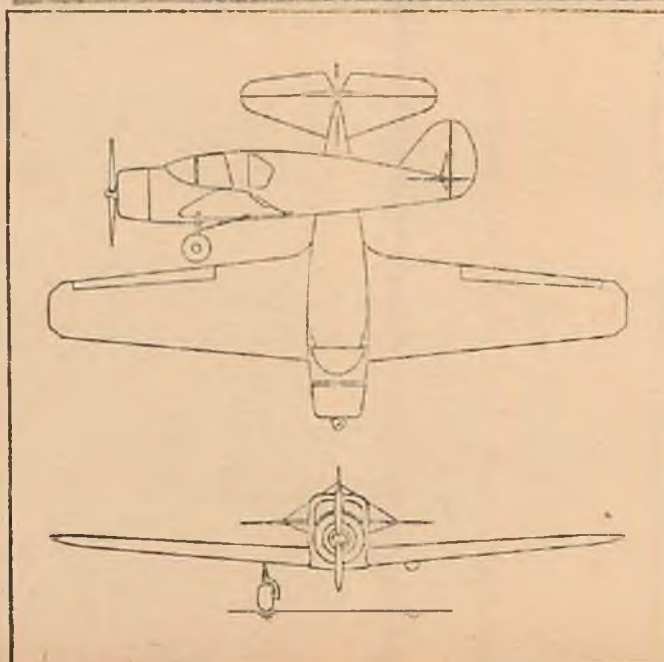


BELLANCA JR.

Rushed to completion for the Chicago Air Show, the new three-place Bellanca 14 is an interesting addition to the light-plane field. It is a low-wing, cabin monoplane with full cantilever wings of wooden construction. Two models are available. The 14-7 is powered with the Le Blond 70, and equipped with fixed landing gear and tail skid. Model 14-9 is fitted with the Le Blond 90 engine and has retractable wheels, brakes and tail wheel. Both models use 18:00x4 semi-balloon tires and oleo shock-absorbers. The 75 h.p. Le Blond available on both models.

Engine	Le Blond 90
Span	34'2"
Length	21'3"
Height	6'3"
Gr. Weight	1,650 lbs.
Useful Load	738 lbs.
Pay Load	412 lbs.
Seating	3
Max. Speed	132 m.p.h.
Cruis. Speed	120 m.p.h.
Land. Speed	45 m.p.h.
Climb	800 ft./min.
Serv. Ceiling	14,750 ft.
Cruis. Range	500 mi.
Price	\$3,150 up
Terms	
A.T.C.	Pending

Manufacturer: Bellanca Aircraft Corp., New Castle, Del.

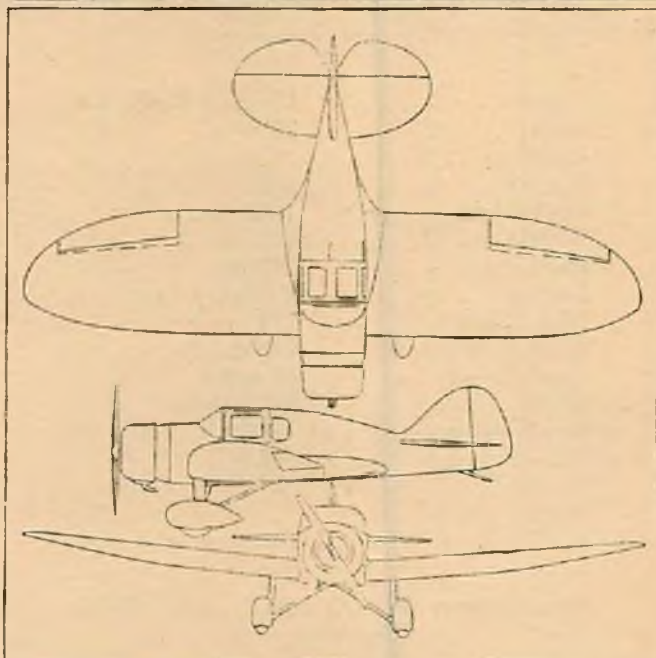


DART G

The Monosport Model G was originally designed and built by the Monocoupe Corporation. It is now manufactured by the Dart Corporation under Group 2 approval with the expectation of an A.T.C. rating in the near future. The Dart is a low-wing cabin monoplane of full cantilever construction. It is powered with the Lambert R-266 engine developing 90 h.p. at 2375 r.p.m. Side-by-side seating and a sliding enclosure permit easy access. Dual controls; rubber engine mountings; oleo landing gear with Good-year air-wheels, standard brakes and spats. The Dart looks and feels like a real airplane.

Engine	Lambert R-266
Span	29'7"
Length	18'7"
Height	6'
Gr. Weight	1,550 lbs.
Useful Load	640 lbs.
Pay Load	301 lbs.
Seating	2 side-by-side
Max. Speed	132 m.p.h.
Cruis. Speed	112 m.p.h.
Land. Speed	40 m.p.h.
Climb	850 ft./min.
Serv. Ceiling	14,850 ft.
Cruis. Range	565 mi.
Price	
Terms	
A.T.C.	Approval 2-541

Manufacturer: Dart Manufacturing Corp., Columbus, O.

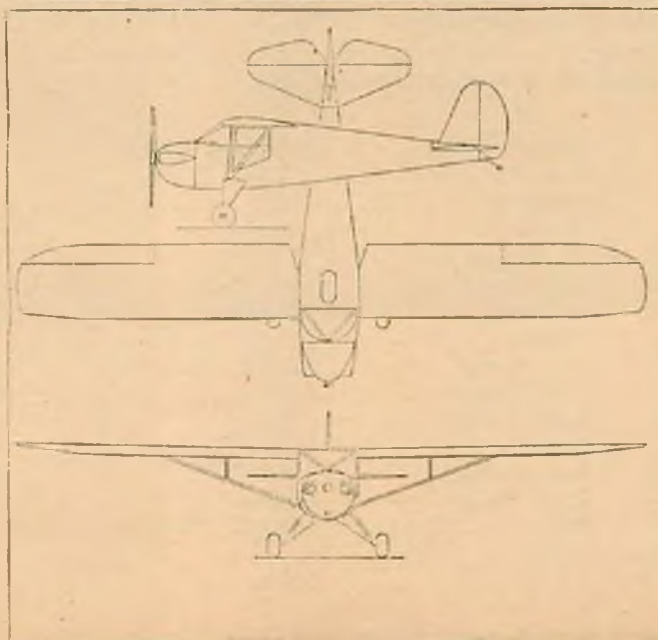


LUSCOMBE 50

Don Luscombe, former designer of the well-known Monocoupe line, enters the light-plane field with a beautifully streamlined high-wing monoplane powered with the new 50 h.p. Continental engine. The ship is built entirely of metal, except for the covering of the wings, elevators and rudder. Another innovation is the use of a specially designed motor cowling which streamlines the cylinder-heads and improves cooling. Direct, overhead or underneath exhaust outlets are available. Luscombe also produces a larger 90 h.p. model of similar design with a top speed of 130 m.p.h.

Engine	Continental A-50
Span	34'6"
Length	19'4"
Height	5'7 1/2"
Gr. Weight	1,130 lbs.
Useful Load	500 lbs.
Pay Load	223 lbs.
Seating	2 side-by-side
Max. Speed	106 m.p.h.
Cruis. Speed	94 m.p.h.
Land. Speed	35 m.p.h.
Climb	750 ft./min.
Serv. Ceiling	13,000 ft.
Cruis. Range	400 mi.
Price	
Terms	
A.T.C.	Pending

Manufacturer: Luscombe Airplane Corp., West Trenton, N. J.



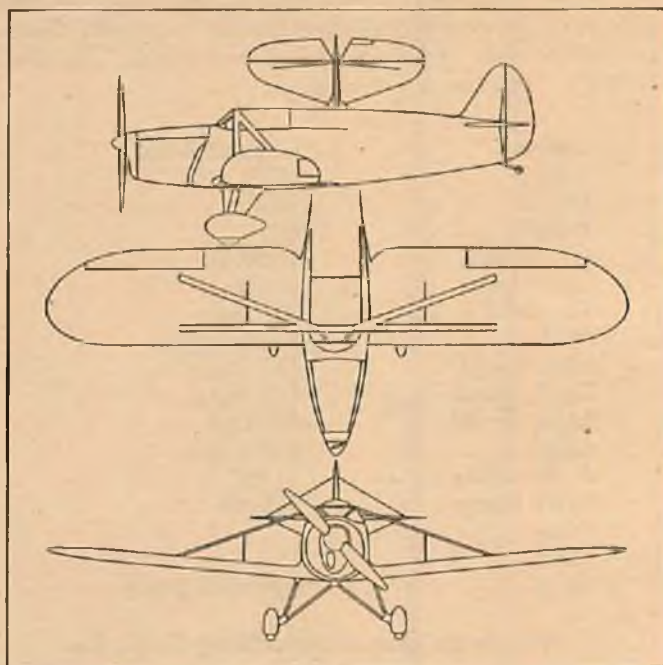
MILLER ZETA Z-1

Howell W. Miller, of the company that bears his name, has recently completed a new two-place, externally braced, low-wing cabin monoplane. The Zeta is being produced in three models, differing only in power plant, and is aimed at the intermediate price class—\$1,500 to \$3,000. The Z-1 is powered with the 95 h.p. Menasco Pirate B-4. The Z-2 has the more powerful C-4, developing 125 h.p. at 2,175 revs, and the Z-3 is fitted with the 150 h.p. Pirate C-45. All three models feature dual controls, side-by-side seating and adjustable cockpit enclosures.

Engine	Menasco Pirate B-4
Span	30'
Length	21'8"
Height	6'8"
Gr. Weight	1,700 lbs.
Useful Load	613 lbs.
Pay Load	240 lbs.
Seating	2 side-by-side
Max. Speed	125 m.p.h.
Cruis. Speed	110 m.p.h.
Land. Speed	45 m.p.h.
Climb	975 ft./min.
Serv. Ceiling	18,000 ft.
Cruis. Range	555 mi.
Price	
Terms	
A.T.C.	Experimental

Manufacturer: Miller Aircraft Corp., Springfield, Mass.

Picture Not Available

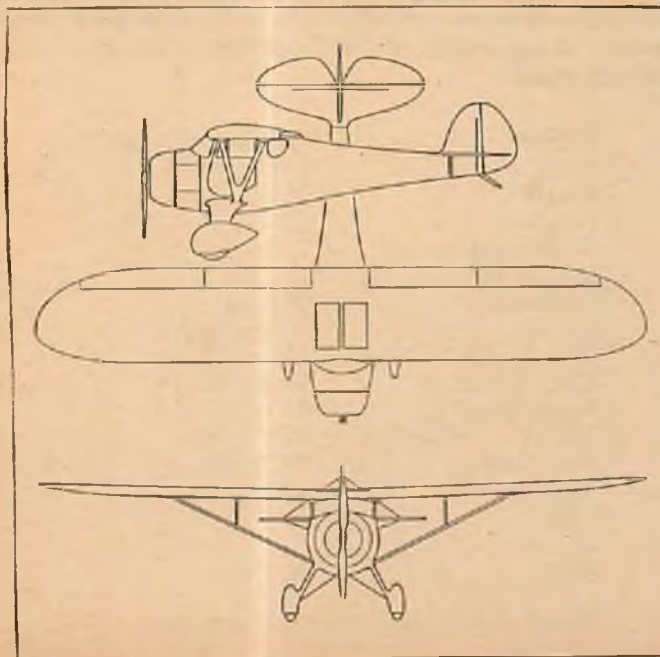


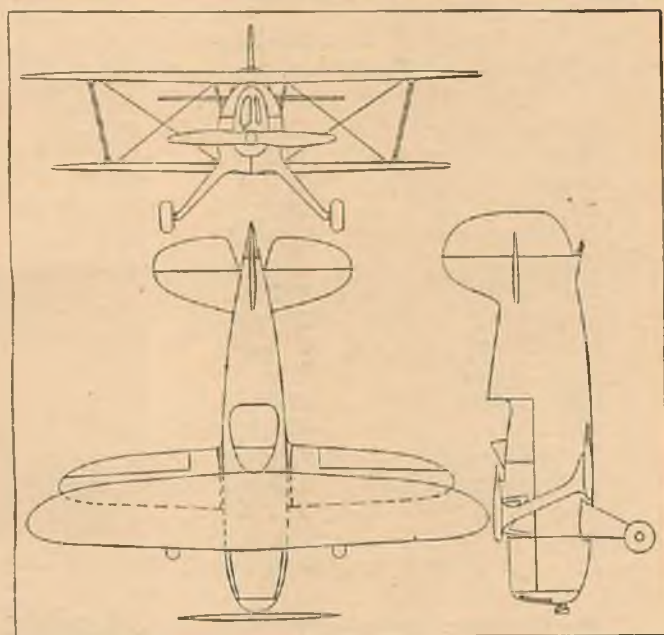
MONOCOUCPE 90-A

The Monocoupe is one of the finest two-place sport planes made in this country. It is a high-wing, externally braced, cabin monoplane of wood and metal construction, powered with the Lambert R-266 engine of 90 h.p. The 90-A features side-by-side seating, dual controls, a generous baggage compartment and a pyralin cabin enclosure. Standard equipment includes a Hamilton Standard propeller, Goodyear airwheels and mechanical brakes, Goodrich shock-cord shock-absorbers, wheel-spats and Grimes navigation lights. A fire-extinguisher, first-aid kit, Shakespeare throttle controls and radio bonding are also standard. Edo floats are available.

Engine	Lambert R-266
Span	32'
Length	20'6"
Height	6'11"
Gr. Weight	1,610 lbs.
Useful Load	637 lbs.
Pay Load	286 lbs.
Seating	2 side-by-side
Max. Speed	130 m.p.h.
Cruis. Speed	110 m.p.h.
Land. Speed	40 m.p.h.
Climb	900 ft./min.
Serv. Ceiling	15,000 ft.
Cruis. Range	600 mi.
Price	\$4,175
Terms	
A.T.C.	306

Manufacturer: Monocoupe Corp., Robertson, Mo.





PAYNE KNIGHT TWISTER

Pilots who have flown the Twister "hands off" in bumpy air, say it is the most stable "little ship" ever built. This tiny single-seater is a single-bay biplane of unequal span which may be fitted with a variety of engines developing between 70 and 75 h.p. The manufacturers of the Twister claim unusual ruggedness and stability as well as economy and safety. They also produce the single-place Sky Kitten, a biplane powered with the Continental A-40 for home building. Both models have plywood-covered fuselages and wings.

Engine	Douglas
Span	upper 15'; lower 13'
Length	13'6"
Height	
Gr. Weight	750 lbs.
Useful Load	284 lbs.
Pay Load	
Seating	1
Max. Speed	160 m.p.h.
Cruis. Speed	130 m.p.h.
Land. Speed	45 m.p.h.
Climb	1,125 ft./min.
Serv. Ceiling	20,000 ft.
Cruis. Range	550 mi.
Price	
Terms	
A.T.C.	Pending

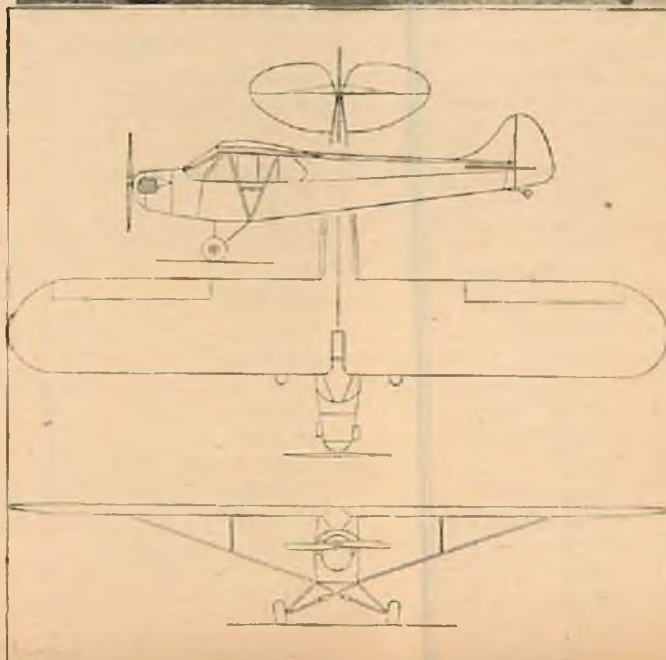
Manufacturer: Payne Aircraft Corp., Joliet, Ill.

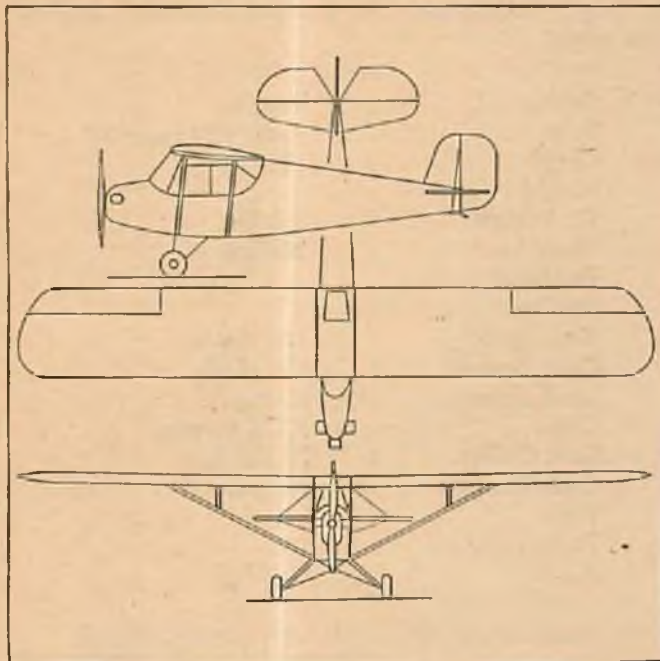
PIPER CUB

Due to their excellent qualities and low cost, more Cubs are in use today than any other make of light plane. The Piper Corporation now offers the famous little ship in two models, both powered with the equally well-known Continental A-40 engine. The J-3 Sport model differs from the J-2 Trainer only in refinement of details. Both are available as either land or seaplanes. The Cub is a high-wing monoplane fitted with two seats in tandem and duplicate controls. A free course of dual instruction is included with each Cub sold.

Engine	Continental A-40-4
Span	35'2.5"
Length	22'5"
Height	6'8"
Gr. Weight	1,000 lbs.
Useful Load	426 lbs.
Pay Load	190 lbs.
Seating	2 tandem
Max. Speed	84 m.p.h.
Cruis. Speed	70 m.p.h.
Land. Speed	30 m.p.h.
Climb	400 ft./min.
Serv. Ceiling	10,000 ft.
Cruis. Range	216 mi.
Price (J-3)	\$1,395
Terms	\$425 down
A.T.C.	595-660

Manufacturer: Piper Aircraft Corp., Lock Haven, Pa.





PORTERFIELD ZEPHYR

The Zephyr is a high-wing, externally braced monoplane manufactured under a Group 2 approval. Accommodations are provided for the pilot and one passenger seated in tandem within a pyralin cabin enclosure. The power plant is a Continental A-40-4 developing 40 h.p. at 2,575 r.p.m. Standard equipment includes dual controls, Goodyear tires, wheels and rubber-disc shock-absorbers, Pyrene extinguisher and first-aid kit. The Porterfield Corp. also produces a de-luxe model (35) powered with a variety of engines including the 65 h.p. Lambert-Velie M-5, the 70 h.p. Le Blond 5-E, and the 90 h.p. Warner Scarab.

Engine	Continental A-40-4
Span	34'8"
Length	21'7.5"
Height	6'11.25"
Gr. Weight	1,040 lbs.
Useful Load	462 lbs.
Pay Load	180 lbs.
Seating	2 tandem
Max. Speed	85 m.p.h.
Cruis. Speed	75 m.p.h.
Land. Speed	35 m.p.h.
Climb	425 ft./min.
Serv. Ceiling	9,000 ft.
Cruis. Range	225 mi.
Price	\$1,395
Terms	1/3 down
A.T.C.	Approval 2-530

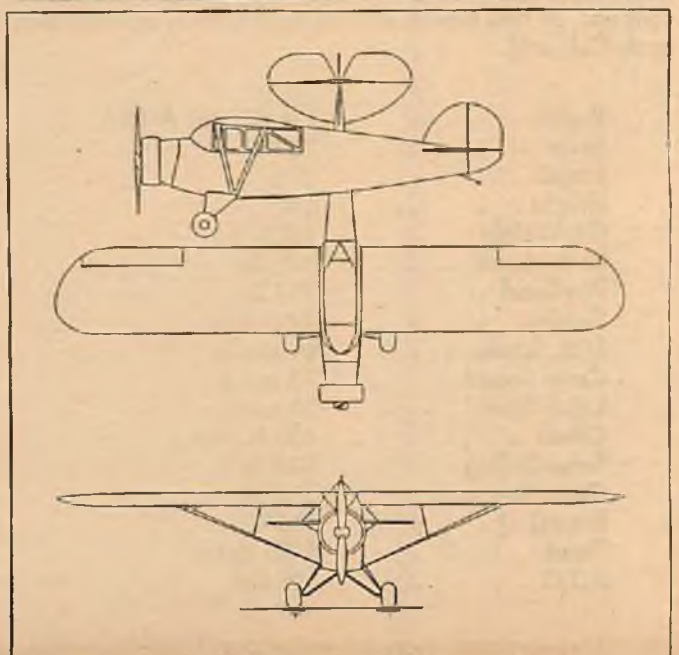
Manufacturer: Porterfield Aircraft Corp., Kansas City, Mo.

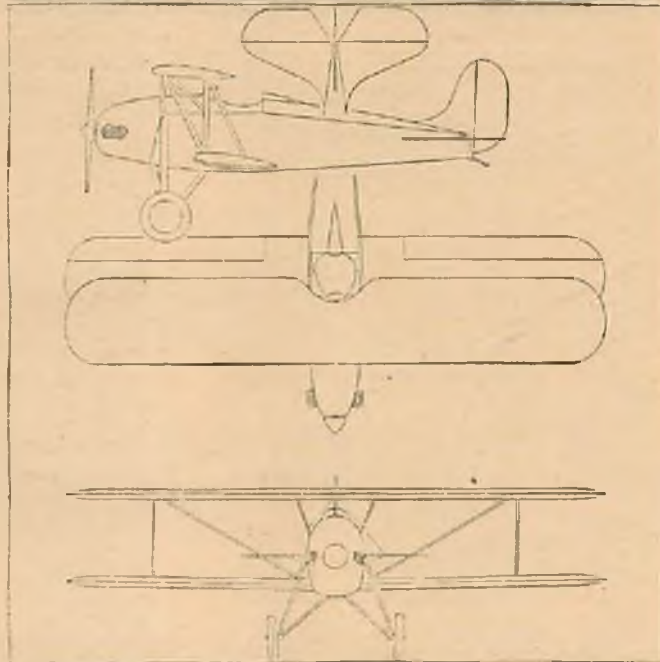
REARWIN SPORTSTER

The Sportster is a high-wing, externally braced cabin monoplane seating two in tandem. It features dual controls, two baggage compartments and hydraulic spring shock-absorbers. Three Sportster models are offered. The 7,000 is powered with the Le Blond 5E engine developing 70 h.p. at 1,950 r.p.m. Model 9,000-L uses the Le Blond 5F producing 90 h.p. at 2,250 revs. The third model is designated 9,000 and is fitted with a 90 h.p. Warner Scarab Jr. Standard equipment includes Flottorp propeller, Goodyear tires and wheels, Shakespeare controls, collector ring, fire-extinguisher and first-aid kit.

Engine	Warner Scarab Jr.
Span	35'
Length	22'3"
Height	6'9"
Gr. Weight	1,460 lbs.
Useful Load	595 lbs.
Pay Load	220 lbs.
Seating	2 tandem
Max. Speed	123 m.p.h.
Cruis. Speed	110 m.p.h.
Land. Speed	38 m.p.h.
Climb	1,000 ft./min.
Serv. Ceiling	17,000 ft.
Cruis. Range	450 mi.
Price	\$3,190
Terms	
A.T.C.	574-591-624

Manufacturer: Rearwin Airplanes, Kansas City, Mo.





ROSE PARRAKEET

With the exception of the Knight Twister, the Parakeet is not only the sole biplane in the light-plane field but also the only single-seater. Manufactured under Group 2 approval, the Rose A-1 is a single-bay, equal-span, staggered biplane powered with the 37 h.p. Continental A-40-3 engine. The pilot sits in an open, single-seat cockpit aft of the trailing edge of the upper wing. The fuselage is of welded steel tube covered with aluminum sheet and fabric and contains the fuel tank. The wings are of wood and fabric.

Engine	Continental A-40-3
Span	20'
Length	16'4"
Height	5'8"
Gr. Weight	728 lbs.
Useful Load	258 lbs.
Pay Load	none
Seating	1 open cockpit
Max. Speed	100 m.p.h.
Cruis. Speed	85 m.p.h.
Land. Speed	35 m.p.h.
Climb	750 ft./min.
Serv. Ceiling	12,000 ft.
Cruis. Range	340 mi.
Price	\$1,475
Terms	
A.T.C.	Approval 2-514

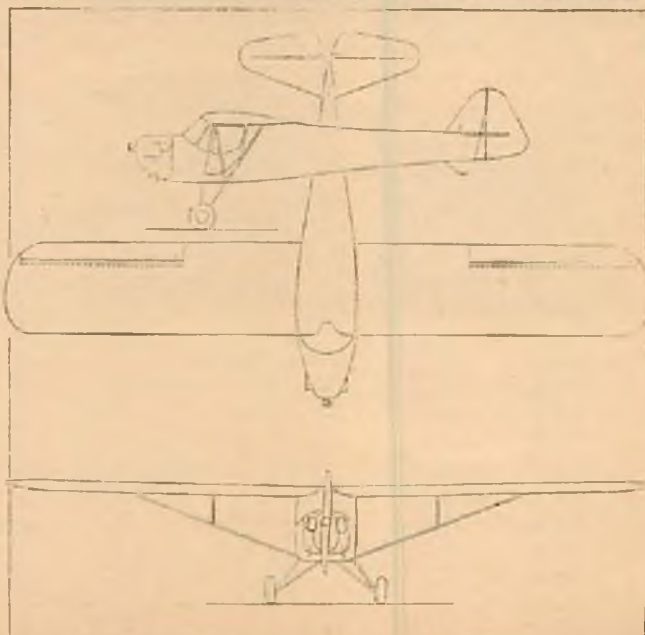
Manufacturer: Rose Airplane & Motor Co.,
Chicago, Ill.

TAYLORCRAFT

Engineered and built by C. G. Taylor, designer of the popular Cub, the Taylorcraft is one of the most handsome and efficient light planes on the market to-day. It is offered in three models; the standard (1-A), the de luxe and the seaplane model. The power plant is the same in all three, the Continental A-40-4, although the structure is stressed for engines up to 50 h.p. Side-by-side seating is featured with dual wheel controls and inset instrument panel. Standard equipment includes Sensenich propeller, Shim wheels, (streamlined spats optional), fire-extinguisher and first-aid kit.

Engine	Continental A-40-4
Span	36'
Length	22'
Height	6'8"
Gr. Weight	1,050 lbs.
Useful Load	464 lbs.
Pay Load	226 lbs.
Seating	2 side-by-side
Max. Speed	91 m.p.h.
Cruis. Speed	80 m.p.h.
Land. Speed	35 m.p.h.
Climb	390 ft./min.
Serv. Ceiling	14,000 ft.
Cruis. Range	230 mi.
Price	\$1,495
Terms	\$495 down
A.T.C.	643

Manufacturer: Taylor-Young Airplane Co.,
Alliance, O.

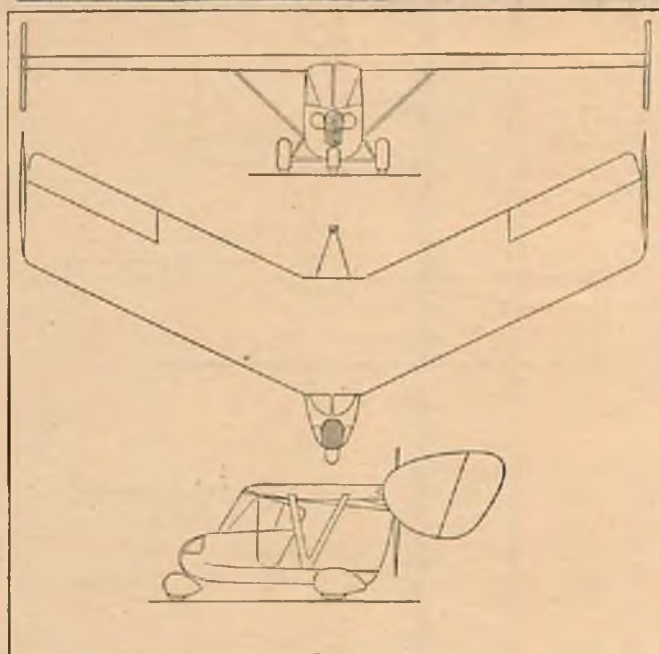


WATERMAN ARROWBILE

Waldo Waterman's Arrowbile is the first true flying automobile. Its tailless fuselage is a rear-engine, three-wheel car which can be driven to the home airport, fitted with wings and flown to a distant field. Upon being de-winged, the Arrowbile continues by road to its destination, thus providing the only door-to-door flying machine available today. In the air, the Arrowbile is a tailless, high-wing monoplane, with fins and rudders at the tips of its swept-back wings. The 100 h.p. Studebaker automobile engine is fitted with a 2:1 Vee-belt reduction gear and a pusher propeller.

Engine	Studebaker-Waterman S-1
Span	38'
Length	19'4"
Height	8'8"
Gr. Weight	2,500 lbs.
Useful Load	559 lbs.
Pay Load	230 lbs.
Seating	2 side-by-side
Max. Speed	120 m.p.h.
Cruis. Speed	105 m.p.h.
Land. Speed	45 m.p.h.
Climb	650 ft./min.
Serv. Ceiling	15,000 ft.
Cruis. Range	375 mi.
Price	
Terms	
A.T.C.	Experimental

Manufacturer: Waterman Arrowplane Corp.,
Santa Monica, Cal.

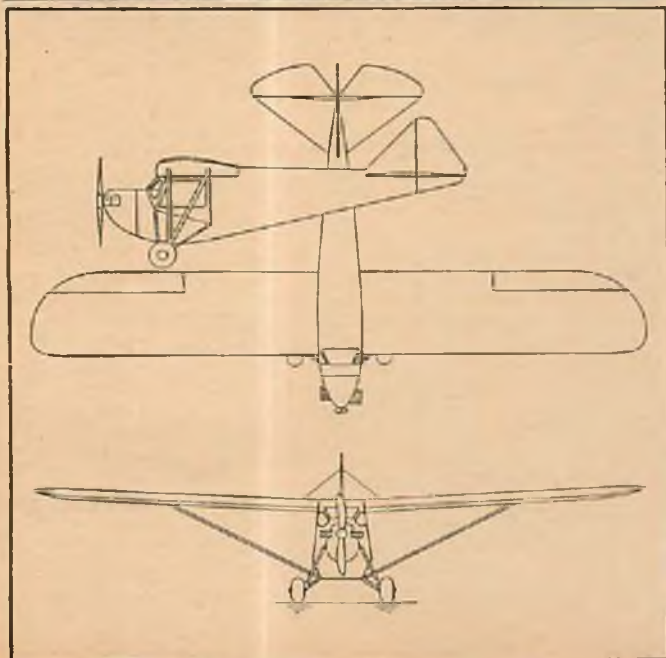


WELCH OW

The Welch OW is a high-wing externally braced monoplane seating two side-by-side. It is being produced in three models differing only in the power plants. Model 5M is fitted with the 40 h.p. Continental A-40-4 engine. 6M uses the 36 h.p. Aeronca E-113A. A third model (7M) upon which license is pending, is powered with the Welch O-2. This is a two-cylinder opposed engine of the air-cooled type developing 45 h.p. at 2,500 r.p.m. Its weight ratio of 2.4 lbs./h.p. is the lowest in its class.

Engine	Continental A-40-4
Span	34'4"
Length	21'
Height	5'8"
Gr. Weight	950 lbs.
Useful Load	403 lbs.
Pay Load	179 lbs.
Seating	2 side-by-side
Max. Speed	93 m.p.h.
Cruis. Speed	85 m.p.h.
Land. Speed	29 m.p.h.
Climb	450 ft./min.
Serv. Ceiling	11,000 ft.
Cruis. Range	250 mi.
Price	\$1,495
Terms	1/3 down
A.T.C.	636-637—2-474

Manufacturer: Welch Aircraft Industries, Inc.,
South Bend, Ind.

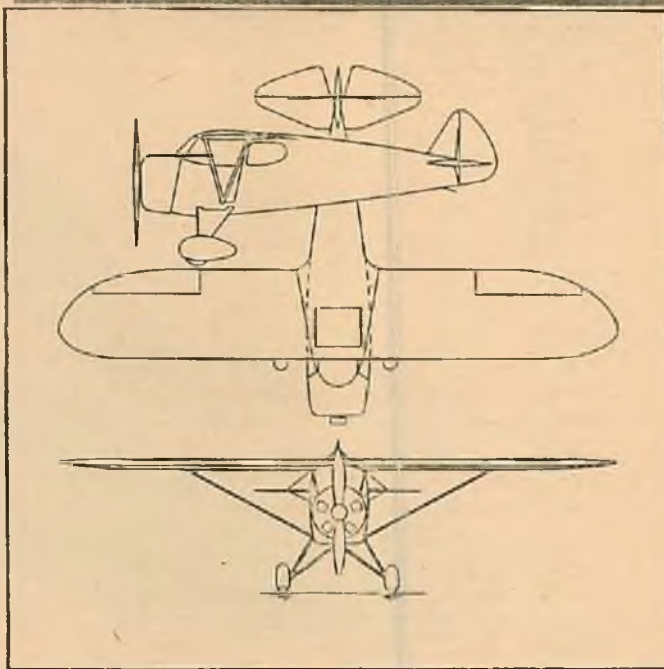


WENDT W-1

Powered with a Warner Scarab Jr. developing 90 h.p. at 2,025 r.p.m., the prototype W-1 is now undergoing tests. The ship is a cleanly designed high-wing monoplane featuring side-by-side seating and dual adjustable overhead-type wheel controls. The fuselage is constructed of welded steel tubing with plywood formers, spruce stringers and fabric covering. The wing is of wood and fabric, externally braced with Vee-type struts. Landing gear is of the fixed type with Goodyear tires, Hayes wheels and mechanical brakes. Standard equipment includes Fahlin propeller, Arens throttle, Pyrene and first-aid kit.

Engine	Warner Scarab Jr.
Span	29'9.5"
Length	19'9.25"
Height	8'2"
Gr. Weight	1,500 lbs.
Useful Load	622 lbs.
Pay Load	285 lbs.
Seating	2 side-by-side
Max. Speed	140 m.p.h.
Cruis. Speed	125 m.p.h.
Land. Speed	38 m.p.h.
Climb	1,000 ft./min.
Serv. Ceiling	16,000 ft.
Cruis. Range	600 mi.
Price	
Terms	
A.T.C.	Pending

Manufacturer: Wendt Aircraft Corp., Niagara Falls, N. Y.



CROSS WINDS

1	2	3	4	5	6	7	8	9	10	11
12				13			14			
15				16		17				
18			19		20					
		21		22		23				
24				25		26		27		28
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34				35		36		37		38
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42	43	44			45		46		47	48
49					50		51			
52				53			54			
55				56			57			

ACROSS

- 1—Broad center portion of wood propeller in which hub is formed or mounted
5—Lifting force in lighter-than-air craft
8—Small devils
12—Kind of shock-

- absorbing landing gear
13—Gone by
14—Tidy
15—Thin transparent mineral used as electric insulator
16—Maker of "Flash" racing and military plane

- 18—Boundary
20—Between a. m. and p. m.
21—Type of dirigible in which shape is maintained by framework
23—Chemical symbol for neon, gaseous element in air

- 24—Whirling descent of airplane without control
26—Main part of church
28—Navy letter designation of a Curtiss scout-observation plane
31—Musical string
33—Bent in crook shape
35—Line of radiant energy
36—Plane structural member carrying outriggered tail surfaces
38—Small spike
39—Accomplish
40—Higher
42—Best-known type of Stinson plane
46—Prefix meaning correct
49—Airplane pilots
51—Hard wood used in shipbuilding
52—Rigid member in semi-rigid dirigible balloon structure
53—Pair
54—South American Indian ruler of Spanish times
55—Sea eagles
56—Conclude
57—Requests

DOWN

- 1—Aerial weapon
2—Hodgepodge

Answers for April

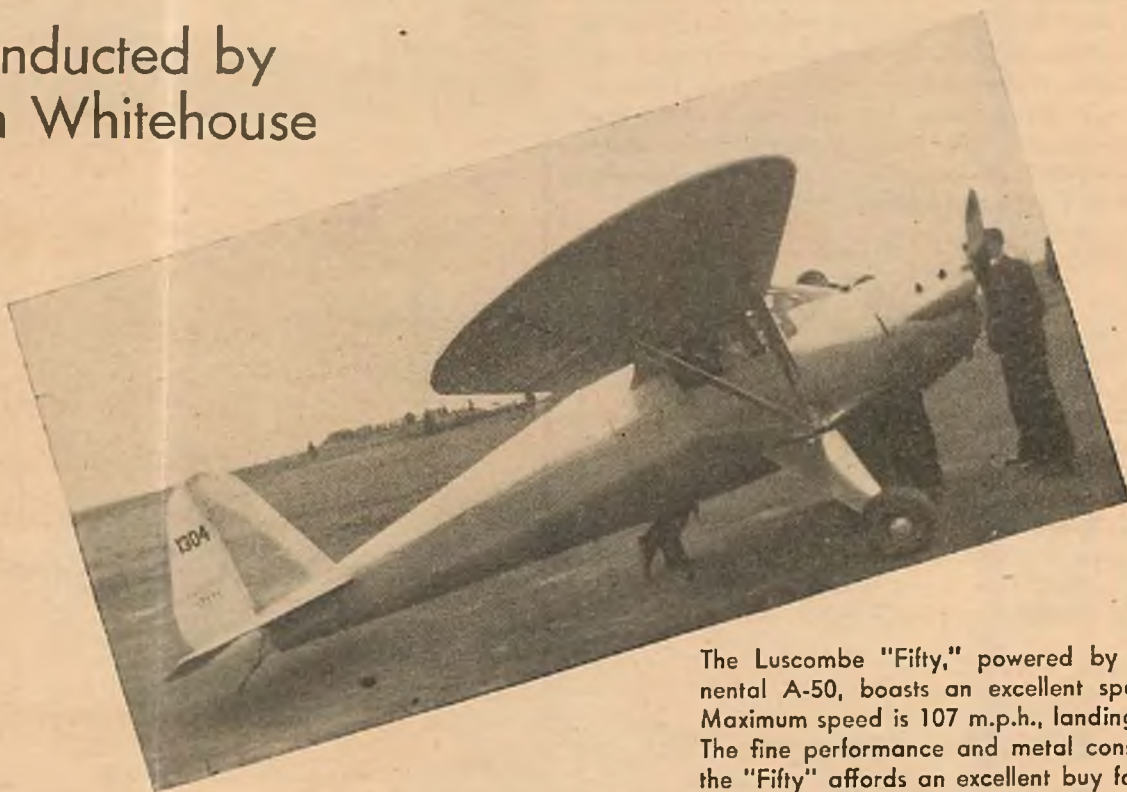
P	I	T	C	H	F	L	A	P	S
T	I	S	S	U	E	A	E	R	I
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P	A	I	R	E	A	R	S	T	U
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S	A	I	G	O	N	B	E	A	S
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C	I	A	E	O	L	I	A	N	O
K	N	U	R	L	S	N	A	V	S
G	N	O	M	E	G	U	S	T	S

- 3—Company making "Airster" folding-wing plane
4—Gaining altitude in a glider
5—Chatter
6—List of things to be done at a meeting
7—Fly a plane alone
8—Silly
9—Repair
10—South American rodent
11—Bracing wire
17—Czechoslovakian light plane
19—Slang expression of disapproval
22—Preposition of direction
24—Druggists' weight, abbreviated
25—U. S. foreign air line, initials

- 27—Part of shoe
28—Spruces up
29—Japanese sash
30—The Centennial state, abbreviated
32—German submarine
34—Type of aero engine starter
37—Go beyond
39—Indicators of aero instruments
41—Post office, abbreviated
42—Slant of airplane wings rearward
43—Always
44—Legal claim on property
45—Knob
47—Cut irregularly
48—Levantine measure of weight, plural
50—Turf

LIGHT PLANE

Conducted by
Arch Whitehouse



The Luscombe "Fifty," powered by the Continental A-50, boasts an excellent speed range. Maximum speed is 107 m.p.h., landing 37 m.p.h. The fine performance and metal construction of the "Fifty" affords an excellent buy for prospective pilot-owners.

G. S. Williams

THE response to this department during the past two months has been most encouraging, and we appreciate the efforts of the many club secretaries who have taken time out from their solos and dual hops to drop us a line and let us know what progress their flying club is making.

On the whole, we must state that for the first time we notice a distinct surge upward in enthusiasm and interest. New clubs are being formed—many replacing older organizations which have simmered down to a state of senile decay. Members are displaying a new brand of initiative and most of them appear to look on light-plane flying as a means to an advanced end, and not as a sport for goggle-and-helmet daredevils who are only exhibitionists at heart. I have been startled by the number who frankly admit they are taking up light-plane flying because they feel that in the not-too-distant future they *hope* to be called upon to play a part in the air branch of national defense.

I state again that most of them "hope" to be called upon, which of course indicates a state of mind. The United States may not be warlike and Americans may abhor the thought of war, but from the attitude of most of our light-plane flyers, it is easy to see that aviation will become our first line of defense in more ways than one, should an enemy power decide to open hostilities with a bomb-dropping competition along the West—or East—Coast. If it is any satisfaction to the Recruiting Department at Washington, we can assure them here and now that there will be no dearth of volunteers for the Air Service, if and when.

However, we're veering away from the subject we had in mind.



The Aeronca K on floats. The pontooned light plane has made possible vacations and trips of unmatched scenic splendor.

Seemingly nonchalant, friend of the pilot flips over the prop on a "K." The Aeronca features side-by-side seating.

G. S. Williams



FLYING CLUBS

The Taylorcraft de luxe. Wheel pants and a lustrous combination trimmed finish distinguish this aristocrat of the light planes. The buyer is given a choice of color scheme and upholstery. The ship is fitted with navigation lights and, in addition to other extra equipment, cabin heater and cabin ventilator.



G. S. Williams

About those new regulations and their significance to light plane flying—the flying club in the colleges—club notes, news and activities.

As many of you know a new set of Civil Air Regulations became effective on November 1st, 1937. As far as could be gleaned from a quick glance through them at the time, the new laws appeared to be a general reclassification of certain categories, simplification of requirements and clarifying of many of the problems involved.

Perhaps it is the nature of the bird, but flying men all over the world are noted for their inherent animosity to any form of regulation; and Americans are no exception to the rule. We all know the period we went through a number of years ago when the matter of licensing aircraft came up. In the old days, the amateur who had the means and the ability to install a motor (any vintage) into a set of longerons and bolt a wing to it, could not understand why a government which had the interest of aviation at heart would not allow him to take off and flit over the landscape—with the privilege of bashing himself into insensibility against any chunk of man-made (or God-provided) piece of obstruction that got in his way. No thought of liability insurance ever entered the picture, for no sane insurance company would even consider such an obvious risk.

To be fair, we must admit that a few such amateurs *did* come through and present the industry with one or two worthy contributions in the way of design or construction. Most of these flyers were racers, and while air-racing has provided certain thrills for the professional



The popular Piper Cub, equipped with Edo floats.

circus manager and the Roman Holiday crowd, only a very few worthwhile contributions to aeronautical science can be traced or accredited to the so-called racing fraternity.

Among the number of letters to this department of late, we note a few who are bringing up the old bleat about the "too rigid restrictions" of the Bureau of Air Commerce civil regulations. Unfortunately, none seem to be very explicit in their complaints or seem able to put their fingers on any particular clause in the code that irritates them.

To explain my position, I should state that in matters of law I am a Caspar Milquetoast, for to me, a law is a law and unless I can get it altered, I keep quiet and play the game. I have found out that this is the best policy in the long run. I have my opinions in certain matters and when I am sure I am right, I can become a very stubborn individual. But generally I am one of those unfortunates who are the first to get nailed for treason, mayhem or toting concealed weapons when the local constabulary decides to fill the township coffers by conducting a sudden campaign against jaywalking, parking without lights or crossing little white lines.

I explain all this to give you an idea why I have a lot of respect for the law and the gentlemen who enforce it.

Personally, I cannot put my finger on any particular point in the new regulations that appears to enforce any hardship on the private or amateur pilot. On the other

Light Planes Abroad



The two-place British Aircraft Swallow, powered by the 90 h.p. Cirrus.

THE BRITISH AIRCRAFT SWALLOW

When an aircraft is advertised as "the safest airplane in the world," it must certainly be admitted that that takes in a lot of territory. Also, only a manufacturer with an unshakable belief in his product and a great deal of courage could go to such an extent, even when he is airing the truth.

This remarkable B. A. Swallow recently gave a performance that will long be remembered as the most amazing accident aviation might ever see. Only because of an error in human endeavor, however, did this little ship have its strange opportunity to perform. A mechanic going about his routine work of warming this plane up for a training flight inadvertently jammed the throttle in a very much open position while leaning over the cockpit. This power supplied to the engine caused the ship to roll across the field in quite a hurry, which motion promptly dislodged said mechanic, leaving only one airplane. A normal take-off was shortly accomplished, even though a mild cross wind was blowing across the airport at the time. Then, as if to bid farewell to the amazed onlookers on the ground, the Swallow made several lazy circles of the home field before it disappeared beyond the surrounding hills. At all times the ship appeared to be under the guidance of an accomplished pilot, and continued its enlightening performance for some thirty-five minutes before being stopped by a tree on the edge of a field. This series of unparalleled events

reached its climax with an account by an eyewitness of the actual end of the flight. This person was following the Swallow in another plane and states that the Swallow actually landed itself. Because no one was in the machine to cut the switch, the ship continued along the ground, plowed through a hedge, hit the tree and cartwheeled to one side. The only damage resulting from this was to wing, motor, and tail surfaces, with both cockpits remaining intact. A plane could certainly do but little more to deserve the all-embracing slogan which it bears.

The Swallow is produced by British Aircraft, who took over the British Klemm company about three years ago and immediately proceeded to revamp the existing models of this firm. This was the beginning of the Swallow—as it is now known—a very safe airplane, but one that is entirely orthodox in design, capable in performance, and economical to operate. Optional power plants are the Pobjoy Cataract III radial or the in-line inverted Cirrus Minor—both being of 90 h.p. and air-cooled. The entire plane is of wood construction with a plywood covering on all but the tail surfaces, which are fabric. A simple folding mechanism, requiring no tools for its operation, allows each half of the full-cantilever wing to swing back alongside the fuselage when a rear portion of the wing near the center is folded up to allow for the necessary movement of the entire portion on a hinge affair at the leading edge.

The design throughout is extremely simple, but very sturdily built to stand the abuse which it must necessarily be expected to take in the hands of the many different types of student fliers who are among its users. Wing and tail surfaces are easily distinguished by their angular outlines, something that one seldom sees in this day of rounded surfaces. Might this be one of the forces leading to the remarkable record this ship has built up for itself?

The full-cantilever tail unit has a stabilizer which can be adjusted on the ground. A wide undercarriage is of low resistance, with specially designed shock absorbers and brakes that can be used either for landing or parking. Comment is quite favorable on the windshields of the plane. (Turn to page 93)



The Swallow resembles closely the old Aeromarine Klem and the Keane Ace.

hand there are many features in the code which appear to be sound, reasonable, and drafted for the ultimate good of the flying club. Where the regulations have been stiffened, it appears that certain facts were apparent, or the stiffening process was incorporated because of lessons learned from the application of former rules.

When any one puts up a squawk about flying regulations being too stiff, I always remember that year in and year out the greatest single cause of aircraft accidents is pilot-error, and pilot-error often means that some one disregarded a rule or refused to heed precaution.

But what are the points our light-plane enthusiasts object to?

There is the old one which demands that any airplane flown by licensed pilots on any legitimate business, which covers practically everything from club flying to interstate air commerce, must be officially inspected and examined for an airworthy certificate.

To me, who still have a lot of healthy respect for the airplane, this is one of the soundest rules in the code. Why, if we are to take the trouble to train men and women to fly along standard lines and issue them official licenses, should we allow them to abuse these licenses and fly an unlicensed plane?

If our pilot licenses are to be worth the card they are printed on, why shouldn't the same jurisdiction extend to the plane the pilot expects to fly? If a licensed pilot, while flying an unlicensed plane, is killed or injured, what will be thought by the man on the street whom we hope to interest in aviation? He will soon lose confidence in the transport pilot's ticket and make it his business to keep away from any form of flight. In other words, if the protection of a license extends only to the human factor, what justification have we for attempting to encourage others to fly?

I am one who honestly believes that all the real advances (Turn to page 94)

ATTENTION TO LIGHT PLANE ENTHUSIASTS!

In response to many requests, and in keeping with our aim to further the sport of light plane flying and the forming of light plane clubs, we offer the following service to our readers.

Upon receipt of 10c in coin or stamps to cover printing and mailing costs we will send a simplified plan for the formation of a light plane flying club, a tested constitution and bylaws from which a workable governing and operating plan can be formulated. These have been arranged with the collaboration of the editors and heads of successful light plane flying clubs now in operation, with slight modifications due to regional and other circumstances.

Please be sure to note the make and type of any light plane you now own, or plan to purchase in the future either for club flying or individual member use.

This will enable us to gauge more accurately the flying club situation as it now stands.

If you're contemplating the formation of a club or are interested in getting the most from your present club, send for these valuable plans at once. Address your request to Light Plane Club Plan, AIR TRAILS, 79 Seventh Avenue, New York City. Be sure to enclose 10c in coin or stamps.

The Air Trails Gallery

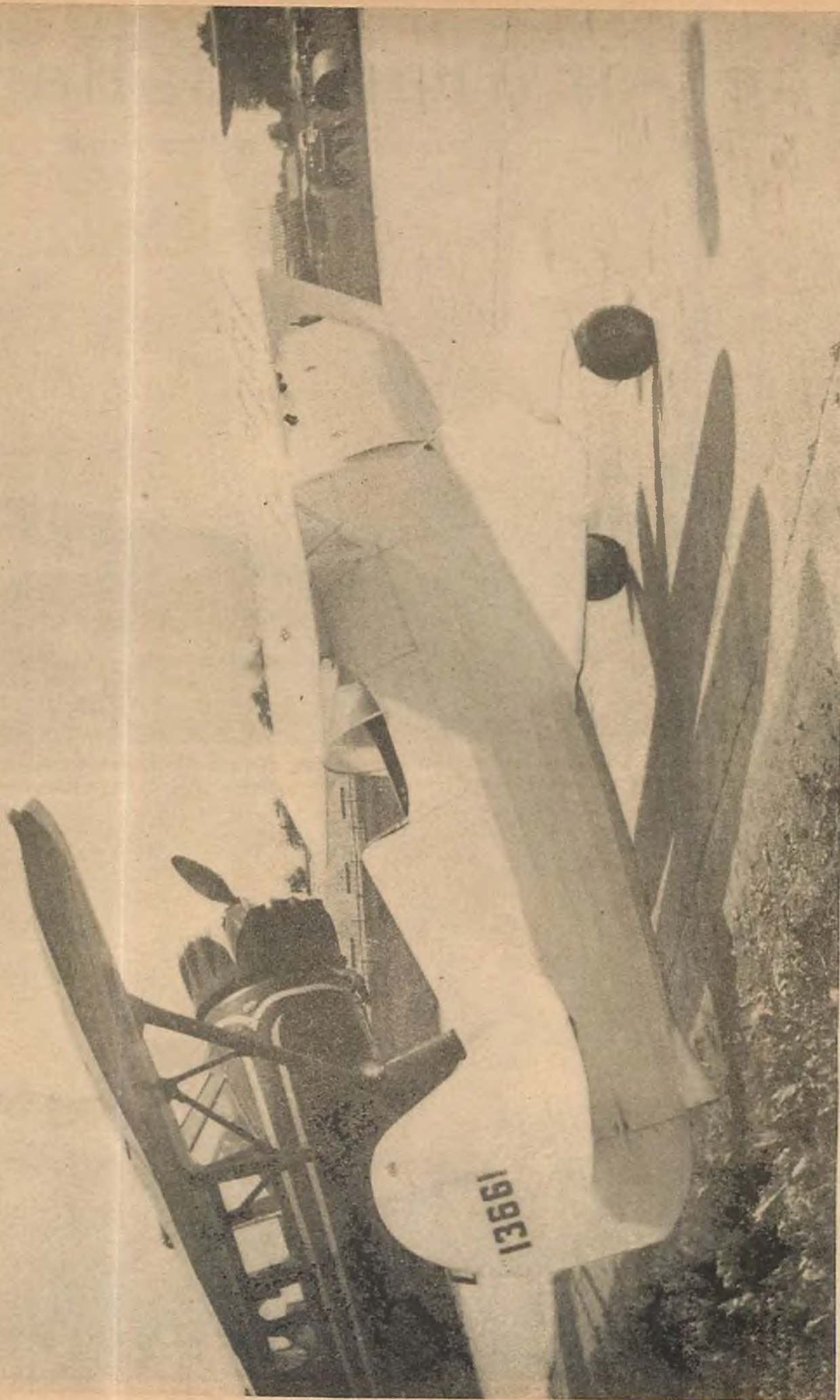
Three full pages of photographs of modern planes.



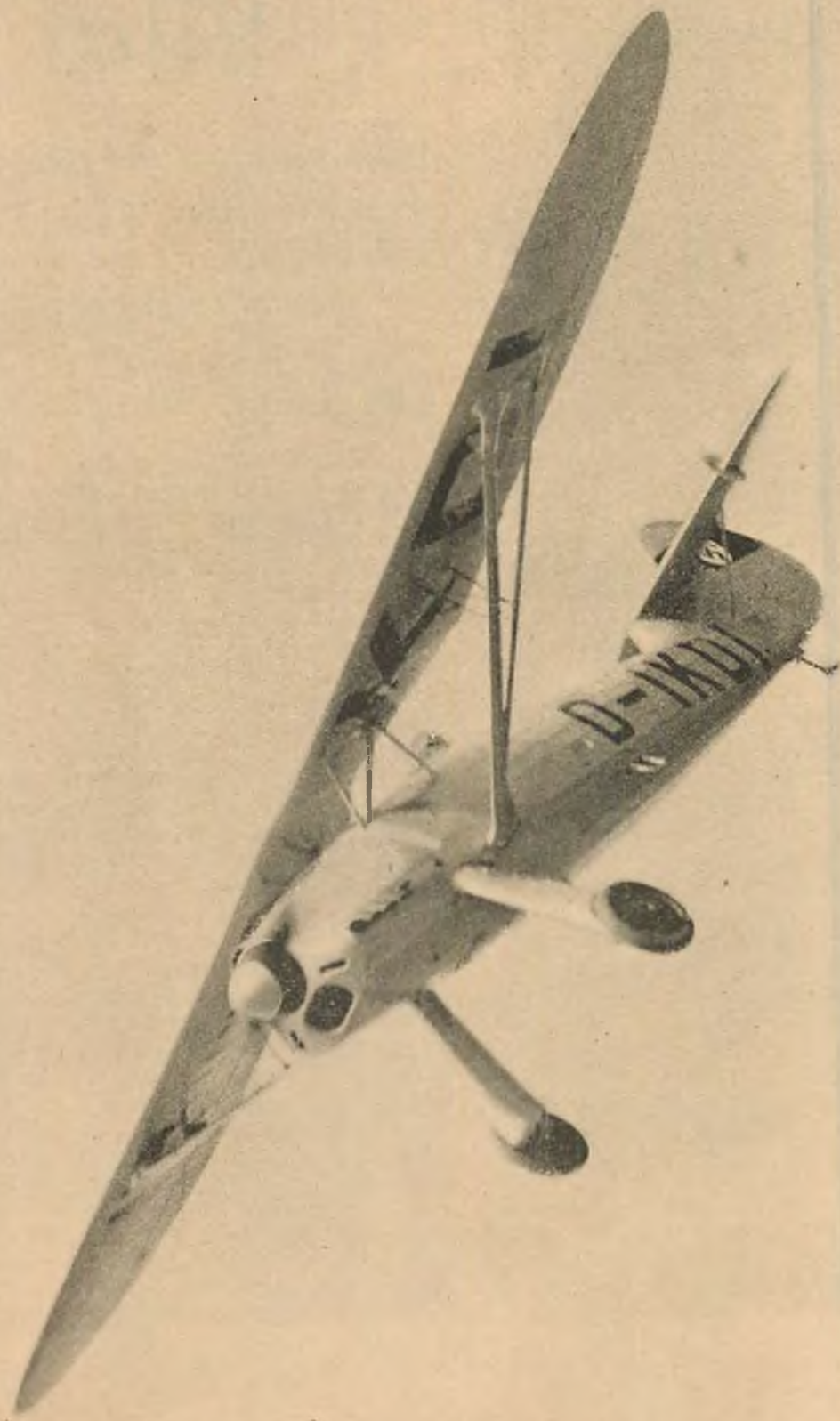
Monkemeier Photos

The Junkers Ju87, all-metal dive-bomber, is fitted with special flaps to brake air speed when diving to permit greater precision in bombing. The engine develops 680-950 h.p. Note sister ship diving in upper right-hand corner of top photograph.





The Payne Knight Twister, fifteen-foot baby biplane, is reputed to be exceptionally stable, flying hands off in bumpy air. The position of the lower wing relative to the ground helps in slow landings. Its ruggedness proven, the Payne's 70-75 h.p. engine can enable the ship to hit 160 m.p.h. The ceiling is 20,000 feet, the rate of climb 1,125 feet per minute. Gross weight is 750 pounds, fuel capacity sufficient for four hours. Ship can be purchased in kit form.



The Focke-Wulf Stösser, powered by the inverted 240 h.p. Argus engine, is one of the world's most popular ships. Used in Germany for radio, gunnery, and bombing training, the Stösser enjoys an enviable reputation for maneuverability. Top speed is 172.6 m.p.h., initial climb 3,280 feet per minute, and landing speed 55.8 m.p.h.

YES, mister, I guess you can call me an old-timer, though I'm only a little past thirty-five. I started flying for Mid-Continental years ago when the passengers rode on top of the mail sacks. In those days nobody had even thought of instrument flying or directional radio beams. The only instruments we had for bad weather flying were a compass to tell us where we were headed and the seat of our pants to tell us whether we were right side up or upside down.

Things have changed a lot since then. With radios and gyro pilots and two-hundred-mile-an-hour planes and "squaws"—hostesses to you—and traffic control systems, a man has to hustle to keep abreast of the new stuff. The radio beams are so accurate now that we can land "blind" by following them right down to the airport until the wheels roll on the ground, and we've actually used them in fog so thick you couldn't see the ground if you were walking on it.

Have you ever seen the inside of the pilot's "office" on these new transports? Come on in, we've got time to look at this one before the ground crew starts to check it over.

Sure, sit down. That's the co-pilot's seat you're in now.

Take a look at that instrument panel. Some spread, isn't it? I've never counted them, but there must be nearly two hundred controls and dials and switches and pushbuttons of one sort or another. Fairly makes your head swim to look at them. Sure, they're all important, but the *best* instrument you can have is a darn good pilot, and don't ever forget it.

Speaking of pilots, there was Jerry Gordon. We hired him as co-pilot back in 1933. He had just finished three years' training with the Army Air Corps and was as sweet a flyer as ever strapped an airplane to his tail. He had trained with a pursuit squadron at Langley Field where they did lots of aerial acrobatics in formation. They used to chase one another under bridges and up the well-known creeks and carry on all manner of hell-raising that doesn't have any place on a commercial transport line. But the Army was just beginning to teach blind flying so Jerry only had a little experience "on the instruments" before he came to Mid-Continental.

Well, that was all right with us. We had a regular training school for our co-pilots and Jerry started right in to learn all there was to know about instruments and flying the radio beams, but after he'd taken one look at that instrument board you see before you, he came to me very seriously and asked what he should do if he ever ran out of pushbuttons and altitude at the same time.

He learned easily and had no trouble in measuring up to our standards, but he took a rather superior attitude toward all the pushbuttons. I remember how he kidded the other co-pilots. "If you want to take off," he'd say, "you push a button. If you want to land, you push a button. If you want to talk to Newark or Chicago or retract your landing gear or talk to your squaw, you push a button. Shucks, you're just a bunch of pushbutton pilots." I guess he was homesick for a pursuit plane and a chance to work some of the vinegar out of his system. He was fairly young for his age and still had the feeling that flying ought to be all dash and flash and glory instead of a safe and conservative transportation business.

Jerry got along fairly well for a few months, and then the routine began to get under his skin, and he was re-

Pushbutton Pilot

Aerobatics and formation flying were his dish, but when ceiling and visibility were zero things began to happen —

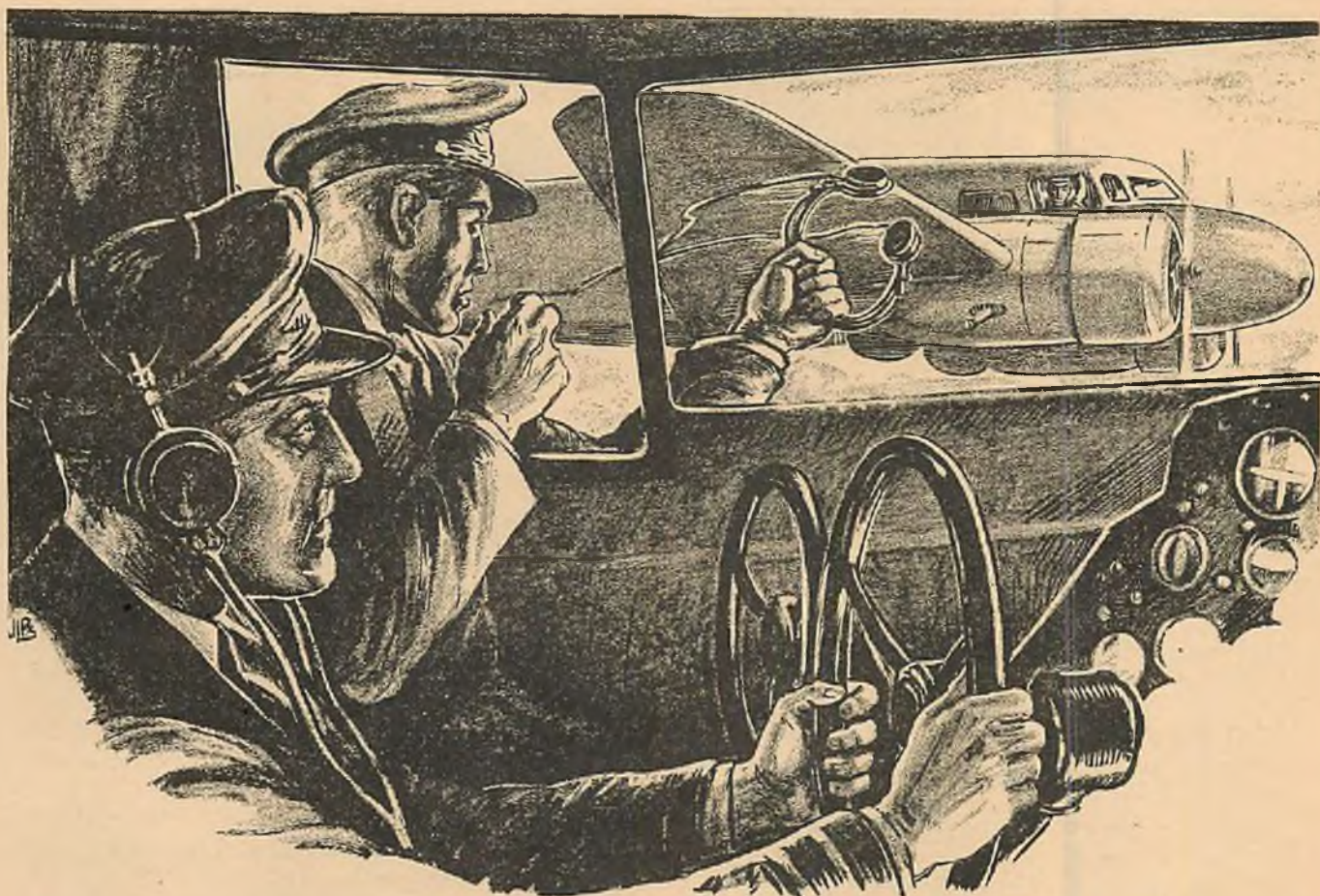
By Lieut. Bill Altenburg

ported for several minor infractions of flying rules. He was banking too steeply on turns and slipping into landings instead of coming in straight and level. Those are little things and not at all dangerous, but sometimes they make the passengers nervous, so his senior pilot had to reprimand him once in a while.

Then one day Jerry's pilot went back into the cabin to speak to the hostess, leaving Jerry to fly the plane. The pilot hadn't been in the cabin long enough for the hostess to say no more than twice when he heard the motors speed up. He looked out the window and got quite a shock to find that Jerry had overhauled one of the slower planes on Trans-Western Airlines (they parallel our route) and was flying in close formation with it, meanwhile making insulting gestures at the Trans-Western pilot, who was mad as hell but didn't dare make any sudden moves to get the kid away from his wing.

That was a serious offense. The Trans-Western pilot reported it to the Department of Commerce and our manager had Jerry up on the carpet and bawled him out. Jerry just grinned and said he must have pushed the wrong button. Then he went on to explain that while formation flying might be dangerous for some pilots it was perfectly safe for him because he was an expert at it. Well, it was pretty rank for a promising youngster to tell a bunch of old-timers what was and what was not safe, so the chief pilot decided to fly with Jerry for a few trips to see whether he couldn't get the kid to take things a little more seriously. I think the chief was hoping for some pretty bad weather so that Jerry would get a real demonstration of just how much conservatism and rules and instruments meant to safe flying.

Now, the chief pilot on Mid-Continental is quite an old-timer himself. His transport license is number twenty-something, and he's a living example of his creed that he would rather be the oldest pilot in the air than the best. Well, they say he's one of the best and consequently one of the oldest. Or maybe it's the other way around. He's conservative about his flying but mighty progressive where advanced equipment and technique are concerned. He was the first air-mail pilot to wear a parachute without complaining that it was "sissy stuff," and it was due to his recommendation that Mid-Conti-



Barton was looking at them curiously, wondering what was going on—Jerry indicated that his radio was no good by holding up the headset—

mental was the first air line to go in for instrument flying in a big way and install directional radio beams at both terminal airports. All the pilots are pretty good "on the instruments" now, and the older ones have had plenty of training at landing blind. So we're putting through a lot of trips that we used to cancel on account of fog.

Jerry and the chief had been flying together for about a week, and the weather had been bad. Mid-Continental didn't have to cancel any trips, but about the only time the passengers saw any ground was when they were landing or taking off. Jerry was getting a good dose of instrument flying. Traffic was heavy and Trip 9, which was the chief's run, was usually full of passengers and sometimes we had to send out a second section. Jerry felt the responsibility of those passengers pretty heavily when the weather was bad, and the chief began to think that maybe his attitude toward pushbutton piloting would change.

They left the western terminal late one afternoon with a full load, heading east. Hal Barton was flying a second section of Trip 9 about ten minutes behind them. The weather was not so good, with five hundred feet of ceiling and scattered ground fog reported at the eastern end of the run, but that was all right for they could depend on the radio beam even if they had to land blind.

The chief pointed his wind-wagon (this very one, by the way) toward the roof and they came out above the clouds at about twelve thousand feet. The sky was clear above them and the sun was just well down on its way toward the horizon. Ten minutes behind them Section Two was climbing up through the solid cloudbank,

following the same course. Jerry was making the radio reports and doing the navigating, and the chief was sort of bored with things and wondering what the missus would have for dinner that evening.

It seemed like just another routine flight until they were about thirty minutes from home and the chief throttled the engines a bit and started to lose altitude. He was dropping gradually toward the top of the cloudbank, getting set for the long glide down the radio beam until he could break out of the clouds just over the airport. They were in the clouds and losing altitude about two hundred feet a minute when a special weather report over the radio told them that the fog had settled right onto the ground and that they would have to depend entirely on the radio beam and land blind. That didn't bother the chief any. In preparing for just such situations he and the other pilots had spent nearly fifty hours apiece flying down that invisible radio beam until the wheels rolled on the ground to a safe landing.

Well, the ground station had just started to repeat the weather data when the radio in the chief's plane went dead. The chief didn't waste much time in turning on the auxiliary receiver but that was dead, too, and so was the transmitter. I won't go into the technical reasons for the trouble now. It was a simple thing that can never happen again, but it was plenty serious at the time.

The chief was on a spot. The weather was bad for two hundred miles around and there was less than an hour of gas left in the tanks. On top of all that, Jerry leaned over and yelled, "Well, chief, which button do we push now?"

(Turn to page 92)



GLIDING AND SOARING

9th ANNUAL SOARING CONTEST

THE 9th Annual Contest, which is the highlight of this country's soaring activities, is to open officially at 3 p. m. on June 25th and close on July 10th. The contest annually draws thousands of spectators from far and wide and is without doubt one of the most thrilling sights imaginable. This year the minimum requirements for flights qualifying for prize money have been raised to exclude secondary ships. For these a separate contest at Frankfort, Mich., will be held later in the summer.

The minimum requirements for the Elmira contest are as follows:

Single-seaters	Multi-seaters
Distance 35 miles	Distance 27 miles
Altitude 3,500 feet	Altitude 2,500 feet
Duration 5 hours	Duration 5 hours

Here are some of the rules and regulations governing the contest, which is sponsored by, and under the supervision of, the S.S.A.

Official flights may take place at any time from any of the five soaring sites.

Official flights may take place at any time during the day or night provided all requirements of the Department of Commerce are complied with, and provided that the Contest Committee is notified sufficiently ahead of time to arrange for an official observer and launching equipment.

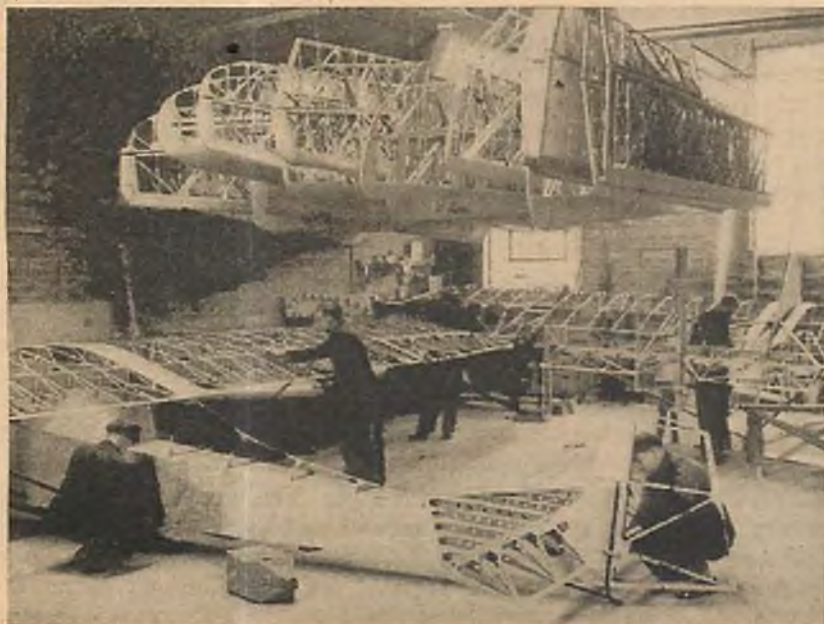
A pilots' meeting is to be held every day, at which time the day's activities and the weather will be discussed.

Persons of any nationality may participate as long as they comply with the following requirements:

1. They must hold valid glider licenses recognized by the Department of Commerce. Contrary to the practice of previous years, the S.S.A. will take no responsibility for licensing flights. Acquiring a license for the glider or the pilot is entirely a matter between the Department of Commerce Inspector and the individual. The S.S.A. will make every effort to have the Department of Commerce assign an inspector during the contest. The contest can be entered only after presentation of the license or its equivalent.
2. They must be in possession of a "C" license issued by the Federation Aeronautique Internationale.
3. They must have an annual sporting license issued by the National Aeronautic Association at Washington, D. C.
4. They must be members of the National Aeronautic Association or a corresponding foreign body. If they are active members of the S.S.A. or the N.A.A., the licensing fees for "C" and sporting licenses are waived.
5. They must fill out and return application forms to the Contest Board of the S.S.A.
6. They must return parents'-consent forms if under 21 years of age.
7. A fee of \$10.00 is required if the participant is not a member of the S.S.A.

The number of contesting gliders is limited to forty. Gliders of any nationality may be entered, providing they are licensed by the U. S. Department of Commerce or by any foreign country which has reciprocal licensing

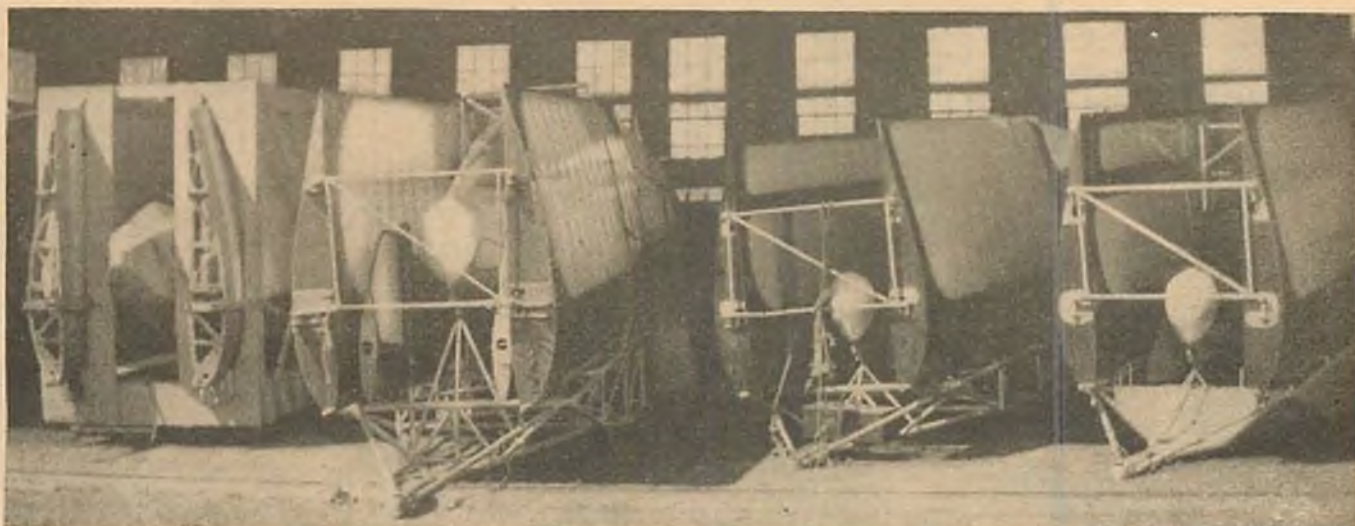
Globe Photo



Above, left to right—Chet Decker, Emil Lehecka, and Alexis Dawydoff at the Annual Airhoppers meeting. Left—English sailplanes being assembled at the Kirbymoorside factory, preparatory to being shipped in July to the first International Contest in the Rhone Valley, Germany.

Conducted by
Alexis Dawydoff

*About the coming Elmira contest—Soaring over flat terrain
—Club news and notes*



Don Stevens

The Haller Hawk and three Bowlus-duPont Albatross sailplanes, packed on their carriages at the Sixth Elmira Contest.

agreement with the U. S. If a Federal Inspector is present at the contest licenses may be obtained there. Application form must be returned to the Contest Board, and must be accompanied by a check or money order for \$5.00. After June 1st the entry fee will be \$10.00.

Contestants may use their own launching equipment, provided that it is inspected and their method approved by the Contest Board.

The S.S.A. provides the following launching equipment for the benefit of all contestants: shock cord for hand, automobile or winch tow. Hand shock cord may be used only with the permission of the Contest Chairman, and only participants in the contest are allowed to stretch the cord. Two or more cars will be provided for automobile tow, as well as tow rope. The total length of the rope will be deducted from altitude performance. Winch tow will be the principal method of launching sailplanes, and the S.S.A. will have at least one winch available. The total length of unwound rope will be deducted from altitude attained in flight.

Tow airplanes will be provided for those gliders and glider pilots who have the necessary Department of Commerce permits. Airplane towing will take place only when so designated by the Contest Board. Anybody wishing to be airplane-towed at any other time may get permission from the Contest Board and pay a charge of \$5.00 per tow.

SOARING OVER FLAT TERRAIN

THE Airhoppers Gliding and Soaring Club of Astoria, L. I., N. Y., intend to conduct a series of experiments this summer in soaring over flat terrain. A suitable flying field located at Hicksville, L. I., has been selected, and a powerful winch, able to tow the gliders up to 1,500 feet, has already been constructed. Preliminary try-outs have proved most satisfactory. On one of these Albert Rosse stayed up for over five minutes in conditions adverse to soaring.

Long Island is particularly suitable for this type of

sustained flight. Located between two bodies of water, its comparatively flat cultivated land, heated by the hot summer sun, is a breeding ground for thermal up-currents. The cool air from the Atlantic and the Sound moving in on the warm air causes a continuous rise, thus preventing the stagnant condition which is sometimes encountered at Elmira and which can ground the soaring pilots for days.

It has been proven abroad by a number of soaring pilots that great distances can be flown over absolutely flat ground. All present international (Turn to page 76)

Wide World

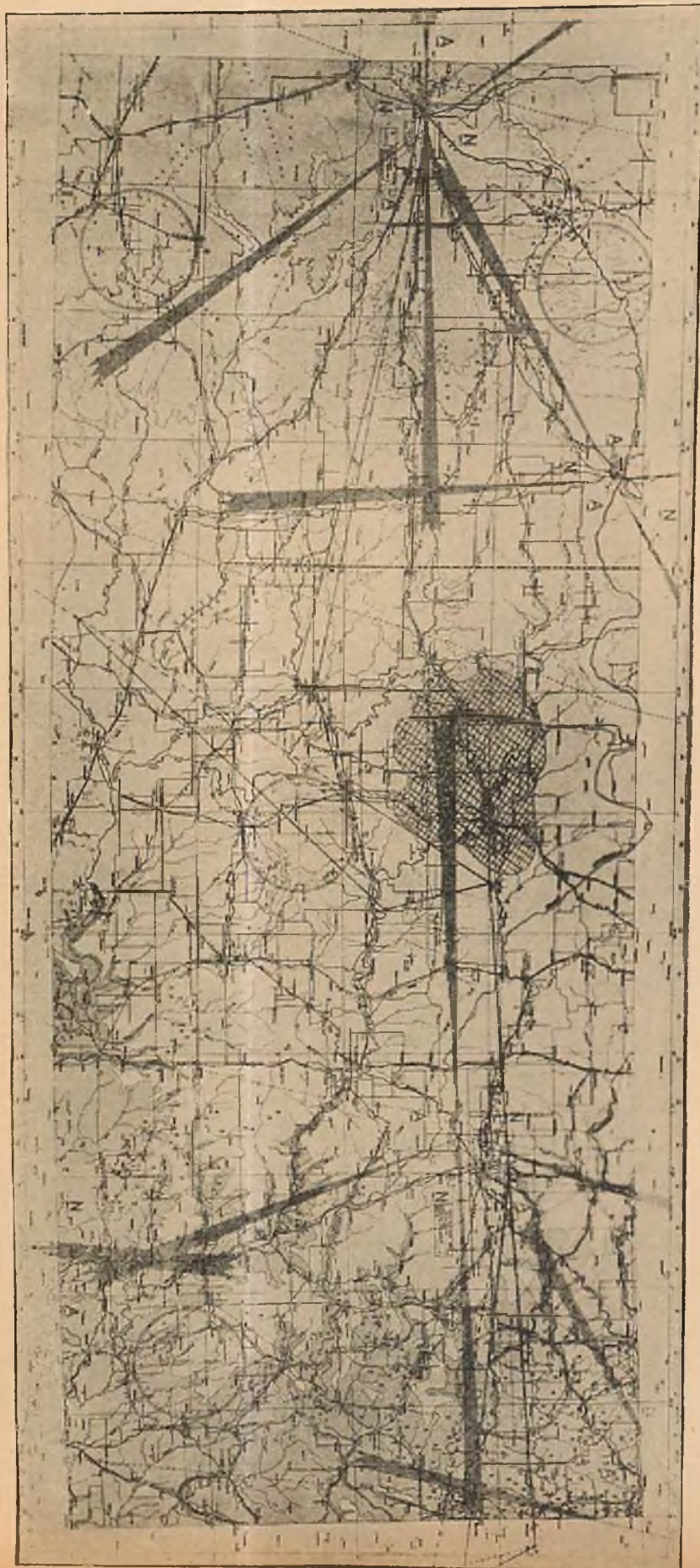


Hawley Bowlus, shown here in his secluded shop on the Oneota Rancho.

PART II.

ELEMENTARY

By
James
Smithson



WHEN the student is able to work the simple problems on course-finding by vectors in a time limit of about five minutes and thoroughly understands the conversion of courses from true to compass and vice versa, he is ready to consider the actual navigation of airplanes in cross-country flights.

Let us assume a plane about to make a flight over the territory covered by the Oklahoma City sectional aeronautical chart. This particular section offers a variety of topographical conditions, and is sufficiently open to require navigation by dead reckoning. Suppose the flight is to be made from the William A. Burke airport at Okmulgee, Oklahoma, to English Field at Amarillo, Texas.

The airline distance between these two points is in the neighborhood of 330 miles. Suppose the plane has a fuel capacity sufficient for about four hours' cruising at 90 miles per hour; this will, under ordinary conditions, make it advisable and perhaps necessary to stop once en route for gasoline. There will be included among the plane's equipment a magnetic compass, properly compensated and fitted with a deviation card, an airspeed meter, an altimeter, a watch or clock, dividers, pencils, parallel rulers, a copy of the publication Airway Bulletin #2, a small chart board, charts of the Oklahoma section and, as a safety measure, of the adjoining sections to north and south.

Before the flight is begun the pilot should obtain all the information possible concerning the weather along the route, condition of the airports and landing fields, and the winds aloft, so that his flight plan can be laid out as nearly as possible before taking off.

Let us assume that it is planned to fly at an altitude of 6,000 feet, and to land at Clinton airport for fuel en route; suppose also that the wind at 6,000 feet is determined to be blowing from 332° true at a force of 20 miles per hour.

The pilot should first lay out his courses on the chart and determine the air speed, heading, track and ground speed, after which he may secure the chart to the chart board for convenient use during flight.

The track (see chart) extends from William

Oklahoma City sectional aeronautical chart for pilots. These charts are published by the Bureau of Air Commerce.

AVIGATION

Your instructor takes you on an actual cross-country flight—continuing a vital series of informative articles.

A. Burke airport in a direction of 268° true, passing to northward of Oklahoma City and El Reno and very close to the small town of Weatherford, Oklahoma. The pilot lays down this track, then by use of the parallel rulers, transfers a line representing the wind direction, from the compass rose to the base point, making it of a length equal to a 20-mile value on the margin scale.

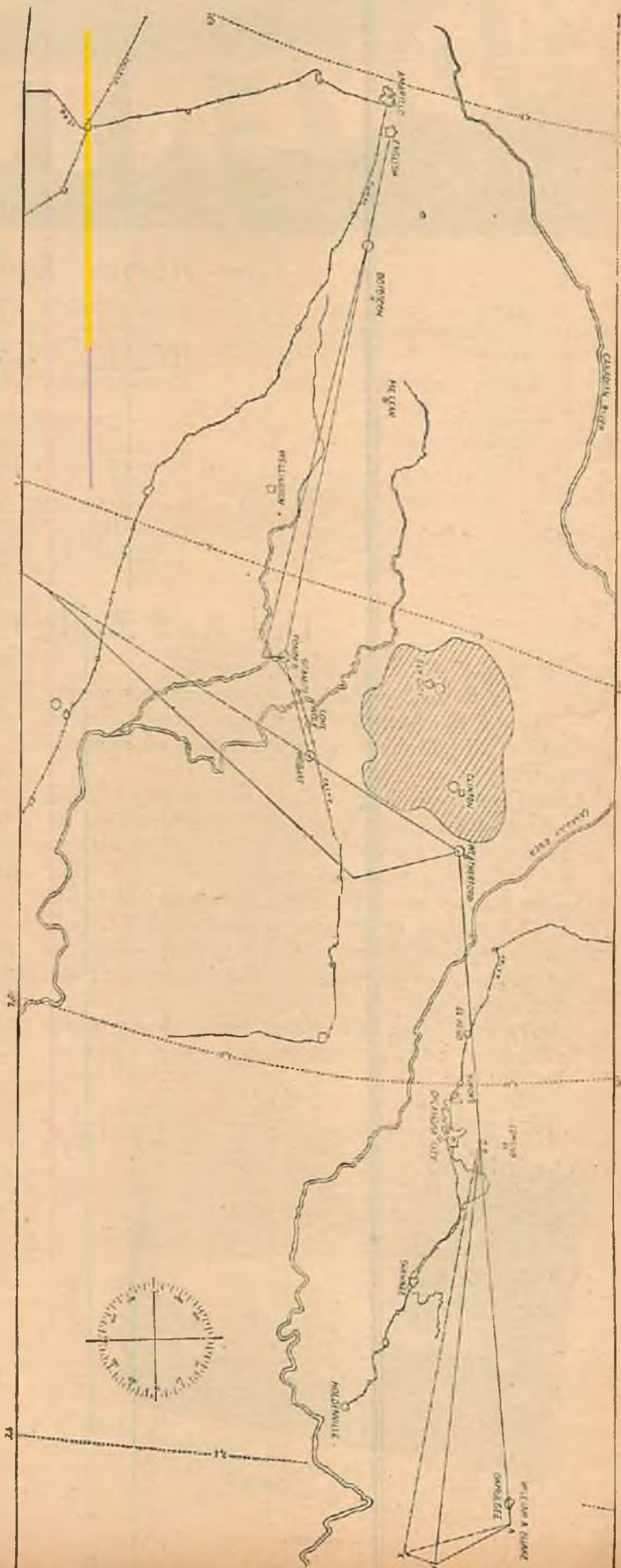
From the formula $2\% \times \text{air speed} \times \frac{1000}{\text{altitude}}$, we find that $.02 \times 90 \times 6 = 10.8$ miles per hour must be added to the indicated air speed to obtain the actual air speed of the plane at 6,000 feet. For the sake of convenience, the decimal can be disregarded and we can assume the plane's air speed then to be $90 + 10 = 100$ miles per hour.

Using this figure, an arc equal to 100 miles per hour on the scale is swung from the point R, cutting the track at B. Transferring the line RB to the compass rose we find the course it will be necessary to steer in order to make good the desired track is 278° true. The ground speed, represented by AB, will be 90 miles per hour.

The variation in the vicinity of Okmulgee as shown by the broken line on the chart is approximately 9° E; the deviation on the desired heading will be found by entering the deviation card with the magnetic value of the course, i. e., $278^\circ - 9^\circ = 269^\circ$. Suppose the deviation on this heading is found to be 4° west; the compass course to steer then will be $278^\circ - 9^\circ$ E $+ 4^\circ$ W $= 273^\circ$.

Before taking off, the altimeter should be set to the altitude of the William A. Burke airport, rather than at zero. In this way, since the airport as well as all other elevations on the chart are based on heights above sea level, the altitude of the airplane will also be indicated in distance above sea level. Thus the altitude of the plane above the ground can always (disregarding possible barometric fluctuation) be obtained by subtracting the elevation of the place over which the plane is flying, from the altimeter reading.

An expedient of vital importance in all navigational flights is that of keeping careful account of the time under way. The pilot who neglects to do this is certain to run into trouble sooner or later. Nor should the memory be depended upon in this regard, as the positions of the hands of a clock are too easily forgotten under stress of excitement or danger. The time that each significant event, such as take-off, change in course, or entering clouds takes place should be carefully recorded either on the chart near (Turn to page 80)



A simplified tracing of the chart on the opposite page, showing the route of the flight described.

AIR ADVENTURERS

The Honor Roll For June

FLIGHT CAPTAINS

M. A. Roy, Verdun, Que., Can.
George W. Echrich, St. Louis, Mo.

FLIGHT LIEUTENANTS

Bill Newmann, Ft. Thomas, Ky.
Allan Chisholm, Detroit, Mich.
George McCurdy, Vermilion, Alta., Can.

PHOTOGRAPHERS

Joseph G. Singer, Queens Village, L. I., N. Y.
Max Couche, Adelaide, S. Australia
Geo. E. Goodhead, Jr., Tulsa, Okla.
Mitchell Wawrzonek, Omaha, Neb.

David G. Boodle, Willoughby, N. S. W.

Australia

Jack Miller, Hamilton, Ont., Can.
Delmar Murray, Enumclaw, Wash.
Norman Dawber, Toronto, Ont., Can.

ENGINE MECHANICS

Sherman French, Chicago, Ill.
Spencer Hope, St. Michaels, Md.

AIRPLANE MECHANICS

Hector McLean, Toronto, Ont., Can.
William Greeley, Milton, Mass.
Alan B. Thayer, Athol, Mass.

Warren Vreeland, Pittsfield, Mass.
Jerry Baer, Madison, Wis.
Frank Pappone, Brooklyn, N. Y.
Daniel Kelly, W. Somerville, Mass.
H. Holder, Napier, New Zealand
E. Howard, Brockville, Ont., Can.

OBSERVERS

J. W. Foster, Miami, Fla.
L. M. Duncan, Asheville, N. J.
Claude J. Badeusz, Chicago, Ill.

TOPOGRAPHERS

Noel J. Breslin, Derry, Ireland
Francis Fitzgibbon, Riverdale, Md.

The Red Badge Of Courage

COURAGE is a strange quality to define.

The dictionary explains courage as that quality of mind which enables one to encounter danger and difficulties with firmness, or without fear or faintness of heart.

Courage is something we all hope to display at some time or another. Secretly we all wonder whether we have it, or whether we would be able to raise a presentable degree of it should an emergency arise. To many of us the modern test pilot taking a plane to 15,000 feet with full intentions of bringing it down for a 9-G pull-out is the acme of courage. Others quietly idolize the transport pilot who day after day flies his ship over vast miles of territory.

I know for a fact that neither would change places with the other, for in these two cases, courage is relative.

What may be a task demanding the most in mental courage for one, is a matter of everyday occurrence to the other.

What a noted author once described as the Red Badge of Courage was most noticeably evident during the days of the World War when men lived and died for what they believed to be their moral crusade. Their stories and adventures have been written, screened and dramatized for years, and their deeds of valor are still presented as high standards for those who came along later.

Some of us who were fortunate enough to live through that Armageddon know that courage, as accepted by those who distribute the awards and decorations, can be widely interpreted, and it is time that someone attempted to define courage in its true perspective.

I knew a man who before the War was a recognized



D. Winterich, North Bergen, New Jersey, took this close-up of a Douglas O-46A.



The 1938 Fairchild 24, powered by the 165 h.p. Ranger.

"bad man." He had once committed a murder and for some strange reason enlisted in the Army and was sent to the front. Many believed he would be one of the first to "make a name for himself" because of his past history.

He did. He turned out to be the greatest coward in his particular division and wound up in a disciplinary battalion—a rank washout.

I knew men who on the ground feared physical punishment in compulsory athletic activity, but who in the air turned out to be absolute madmen against the Fokker scourge. I knew men who considered four hours out in No-Man's-Land on wiring parties a good night's fun, but who when asked to carry a bag of Mills bombs up a trench, farked it completely and blubbered like babies.

I knew pilots who reveled in a dog-fight, but who when asked to carry four 25-pound Cooper bombs under their Camel fuselages, immediately "reported sick" and were almost cashiered for malingering.

A particular friend of mine spent four solid months with a trench-strafig squadron and actually enjoyed flying Dolphins a few feet above the enemy trenches, but who would break down and bawl if you asked him to swing your prop.

Men who thought nothing of looping a Camel fifty feet off the ground were terrified of motor cars, and believe it or not, many still are. Men who had had marvelous records on two-seaters turned out to be flops when transferred to pursuit planes. Men who had endured months in the trenches went to pieces when they were fired on by anti-aircraft batteries, 15,000 feet below.

What then is courage? Why is it the average power pilot refuses to go anywhere near a glider? Why is it that my friend, a noted transport pilot, positively refuses to accompany me to the top of the Empire State Building?

The real answer of course is that courage is relative and cannot be computed by any set standard. What may be bravery in one man may only be routine in another, and we are making a great mistake when we attempt to compare our own actions with those of another.

To you Air Adventurers then, I offer this lesson in hope that many of you will benefit by it. I know that many of you wonder how you can face your own personal problems, but your courage is all in your own mind. It's there for you to utilize, whether it be for the purpose of getting into aviation or accepting the undeniable fact that you can't. The man who can display his courage when he faces the realization that he cannot become an air-line pilot and accepts the alternative of playing some other rôle in the industry, is the man for my money. If your finances are such that you cannot purchase flying training, have courage in yourself and go on and attack the problem from another angle—perhaps through the flying club.

It takes courage to say: "All right, if that's the situation, I'll try it some other way." You can't bluster your way through when it comes to designing a successful R. O. G. Your model will not maintain stability on the strength of your vocal outburst; it takes courage to keep plugging and a cool head to find out what is wrong.

If you have some physical weakness that bars you from attempting to enter the Army or Navy Air Service, your courage should tell you that there are still hundreds of openings for men who can think, men who can keep cool on the ground when things are hot in the air. Men

Photographic study of a P-26A, by Peter Kraus of Buffalo, New York.



whose imagination will perfect the wide range of instruments that make aviation what it is today.

It's a great word, courage, but be sure you have the right interpretation and then apply it to your own case. We can't all be heroes and medal winners, but we can be Air Adventurers!

So, if you are not as yet one of us, clip the coupon below, add ten cents and send them in. I'll do the rest.

Your Flight Commander,

Albert J. Carlson

AIR ADVENTURERS' NEWS

THE reports continue to roll in and our list of Craftsmen, Captains, Flight Lieutenants, Engine Mechanics, Topographers and Photographers continues to grow. It is all very encouraging and we of Air Trails are convinced we are at last on the right track. We want to give you something more than just a magazine, for we feel we owe you and Aviation more than gratitude for the way you have rallied around and stayed with us.

We sense this great responsibility and hope we are holding our end up. If not we want you to tell us where we fail. We want sane, constructive criticism as well as pats on the back. If the magazine lacks any particular feature you believe will help you become finer Air Adventurers, we want to know what it is.

We have our problems, of course, as does every publication of this kind, and whenever possible we take time out to explain them. It must be obvious that there can only be so many pages to the book and so many subjects to cover, and to use an old printer's chestnut, there is no place for "rubber type" in a publication of this kind, which means we can only put in so many words, so many pictures and so many drawings. (Turn to page 82)

(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 July 15, 1934.)

Bill Barnes Takes

From across the bleak reaches of the Atlantic came an S.O.S.—In a crisis demanding the most of man and machine, Bill frustrates a ruthless plot

BILL BARNES slowly pushed back the chair in which he was sitting in the living-room of his bungalow on Barnes Field, Long Island, got to his feet and moved over to a window overlooking the myriad concrete and tarvia runways that crisscrossed the field. The transverse bands of yellow-and-black pigment painted across the runways, to aid in night or fog landings, gleamed in the glare of the morning sun.

He gazed across the field with eyes that were red and swollen. He did not even see the electrified wire fence that contained burglar alarms in the strategically placed guard posts, or the armed guards patrolling their beats. He didn't see anything because he was close to complete exhaustion.

He stared, almost stupidly, as one of his yellow-and-black-and-scarlet Snorters came plummeting down out of nowhere to fishtail in for a landing. He saw I. Kinter Hassfurther, better known as Shorty, slide over the side of the forward cockpit to the concrete.

That is, he saw him, but it didn't register. He was too tired even to think. Wearily, he turned back to his desk and the pile of papers on it. He had been going at top speed for months past—now he was working on nervous energy alone. He was nearing the breaking point. He had sapped his reserve vitality and his nerves were beginning to scream.

He started violently as a knock sounded on his door and Shorty Hassfurther, his chief of staff, pushed it open. Bill turned half around, grunted and swung back to his desk.

Shorty's hard-bitten, blue eyes were narrowed as he dropped into a chair and studied Bill's haggard face. He shook his head slowly from side to side.

"Just plain dumb," Shorty said quietly.

"Eh?" Bill snapped. "Who's dumb?"

"You are! I've always had the idea that you were a reasonably smart boy.

But I've changed my mind. No one but a half-wit beats his head against a stone wall because it feels so good when he stops."

"Listen," Bill said, "when I want your opinion and advice I'll ask for it. In the meantime, please get the hell out of here. I'm busy."

"Yeah," Shorty said. "And I'll be even busier when I'm not only doing that work you're doing, but spending half my time running out to some sanatorium to try and cheer you up."

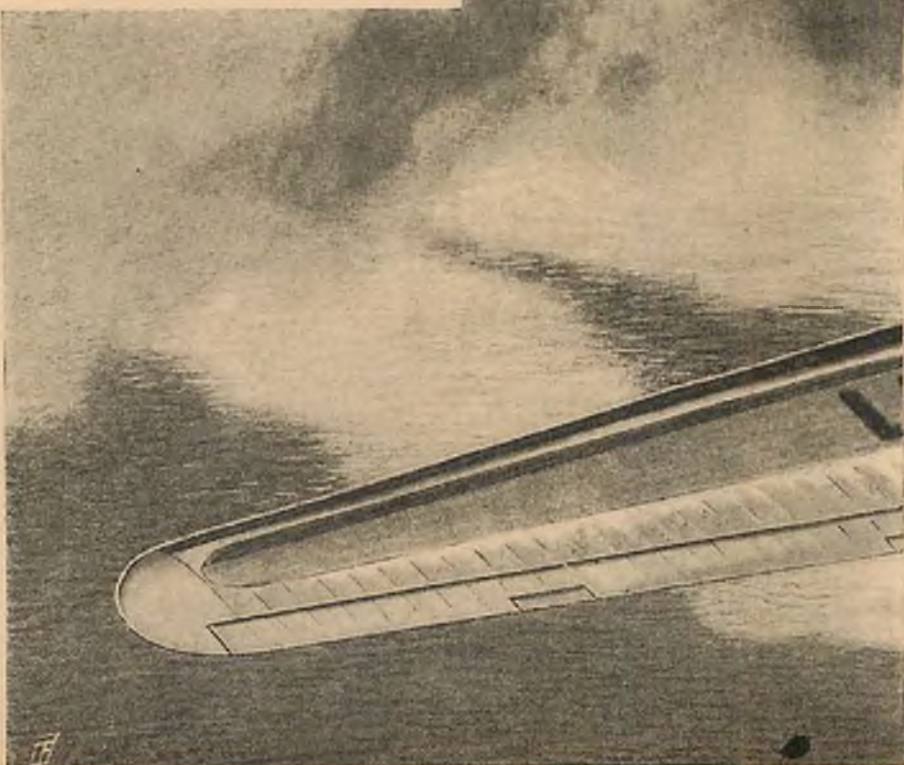
"Don't worry about me," Bill growled. "I'll make out."

"Somebody's got to worry about you," Shorty said. "You don't seem to have enough sense to worry about

yourself." His voice suddenly grew sharper. "Listen, Bill, we're all worrying about you. You've got to lay off and get a rest or you're going to pieces.

"This bird who calls himself the Saver of Souls ran you ragged for months—while your regular work piled up. You're human like all the rest of us. One of these days you'll begin to see little men in pink pants and yellow jackets running around the ceiling. Then it will take you months to get well instead of the two or three weeks' rest you need now."

The bullets chopped into the duralumin skin of the big ship and crept forward as the flight-navigator lifted his head—



a Holiday

**A
Complete
Air Novel**

By
George
L.
Eaton



"I've got to get this stuff out of the way first," Bill said. But his voice didn't carry conviction. It was the voice of a man who knows that he can no longer think straight.

"You aren't in any shape to get anything out of the way," Shorty said, his tone soft and soothing now. "I got my lesson at that stuff during the War, Bill. I was only nineteen years old then and thought I was tireless—that nothing could break me. I was with the British and my C. O. tried to make me take a rest. But I was too smart. I wanted to keep on knocking down my German every day instead of taking time out to eat an apple. I finally went to pieces and a Heinie nearly shot my head off. He trimmed my buttons off properly, and I was in the hospital for three months. I didn't have enough sense to take a rest when I needed it most.

"The same thing will happen to you," Shorty went on. "Something really important will come along and you won't be in any shape to handle it. You'll get your ears pinned back and spend a few months wondering how it happened."

Bill threw a pencil down on his desk and looked at Shorty out of bloodshot eyes. For an instant he seemed to have more than a little trouble controlling himself. "I am tired," he admitted. "I'm so tired I can't seem to make any decisions. But who is going to take care of this stuff if I don't?"

"Now you're talking like a sane man," Shorty said. His round, Pennsylvania-Dutch face broke into an encouraging smile. "We can handle things while you take a holiday, Bill. None of this stuff is half as important as it seems to you. You'd realize that if you weren't so tired. It's just run of the mill stuff. A couple of surveys, requisitions and orders. You've lost your perspective as to what is important and what isn't."

"Perhaps you're right," Bill said. "I'm in a daze. If I could only get some sleep. But I can't eat or sleep. I—"

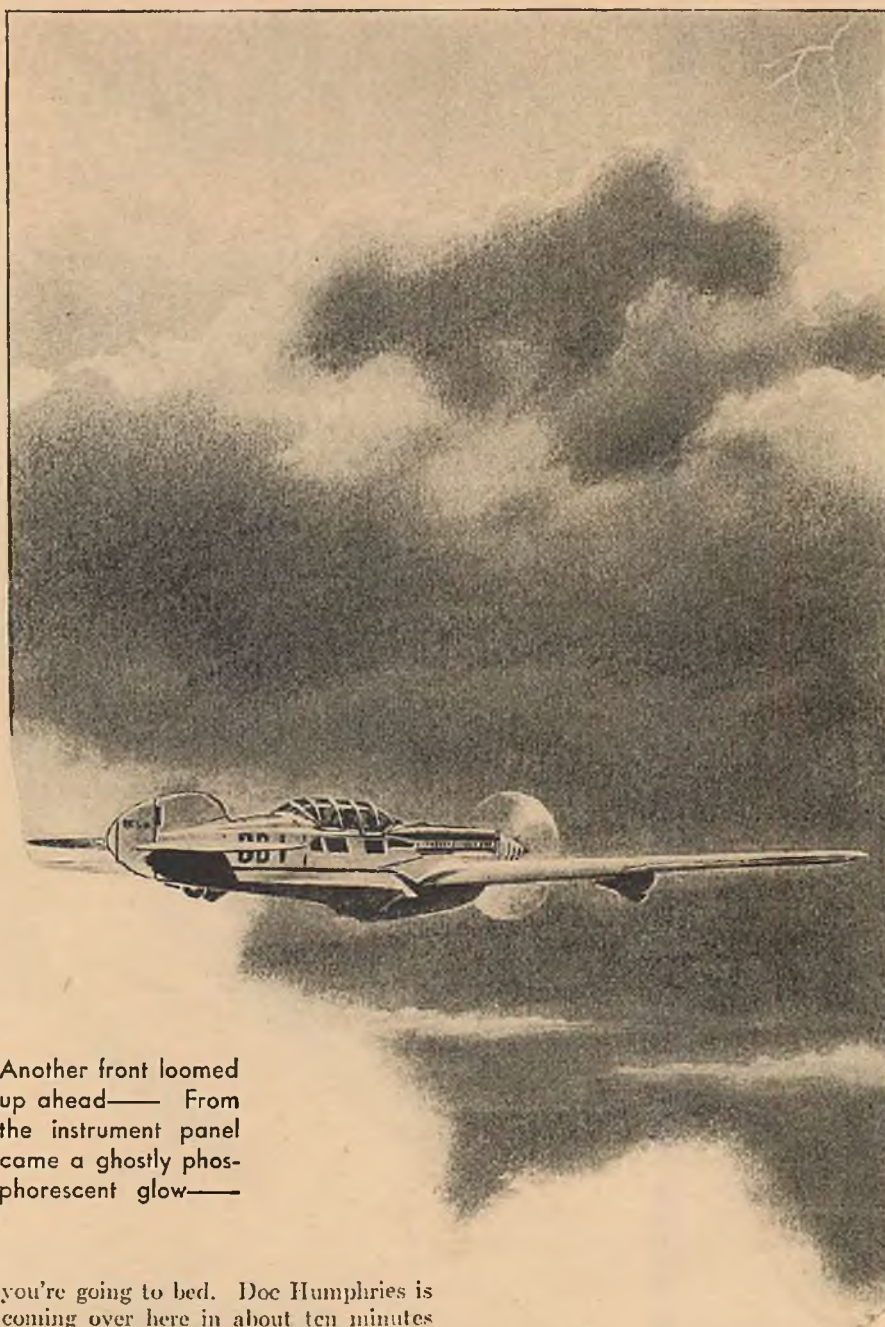
"Listen, fellah," Shorty said. "You're going to get some sleep. Red Gleason and Sandy and I decided to take the matter into our own hands. Bev Bates and Scotty MacCloskey are in on it, too. Scotty has a half dozen grease monkeys and technicians going over the Lancer right now. He's tuning her up for your trip. Sandy is going with you."

"Trip?" Bill said.

"To England," Shorty said as though he was speaking about a ride uptown in the subway. "We all know you've been wanting to get over there to check up on some of their new ships for months. Well, now you're going and Sandy will hold down the rear cockpit in case you fall asleep on the way over."

"Ridiculous!" Bill exploded.

"No, it's very logical. And right now



Another front loomed up ahead— From the instrument panel came a ghostly phosphorescent glow—

you're going to bed. Doc Humphries is coming over here in about ten minutes and give you something that will quiet you down and make you sleep. If the weather is right you and Sandy will hop anytime after sun-up in the morning. You're going to have a holiday whether you like it or not. So you might as well get used to the idea. If we see you around here before three weeks are gone we'll throw you out on your nose."

"Now listen, Shorty," Bill began.

"Listen, hell! Get out of those clothes!"

The two triple-bladed, automatic-pitch props of the Lancer were ticking over slowly when Bill Barnes came out on the apron early the next morning. The rays of the rising sun played across the alloy steel and shining dural of the big ship and made it appear like a thing alive.

His bronzen face was lined and haggard, but his eyes lit up with pride as they flashed over the Lancer from the

tip of her spinner to the trimming tabs on her rudder.

Gathered on the apron were the remaining members of his famous little squadron of flyers: Shorty Hassfurth, his chief of staff; the carrot-topped Eric ("The Red") Gleason; the brown-eyed Bostonian with the Harvard accent, Beverly Bates; and the last and youngest, the irrepressible Sandy Sanders, who drove them all half mad with his thousand and one hobbies.

With them was that lugubrious old Scotsman, Scotty MacCloskey, who was Bill's head technician and had been a British ace before wounds and accidents incapacitated him for flying. He was fluttering around the Lancer like a mother dressing her only child for its first party.

He inspected the 37mm. automatic engine cannon that was built integrally with the motor in the Vee of the cylin-

ders and fired through the hollow prop shafts. It could pour explosive, incendiary or armor-piercing shells at the rate of three hundred shots a minute.

From troughs along each side of the engine peeped the noses of two .50-caliber guns. The guns were set on either side of the pilot's seat in the forward cockpit, within easy reach in case of jams. They were equipped with automatic ammunition counters and engine-driven synchronizing gear. A dull, burnished-metal, telescopic sight was directly before the pilot's eyes.

At the ends of the silver, all-metal cantilever wings gleamed navigation lights, and underneath the belly, protruding slightly, were the slots containing emergency landing flares.

The pilot's cockpit, just back of the rear-wing spar, contained a complete set of blind-flying instruments, including the Kreusi short-wave direction finder, along with all the other instruments to be seen in Bill's ships.

The rear cockpit was equipped with a complete set of duplicate controls and navigating instruments and a flexible .30-caliber Browning mounted on a track in the rear of the pit. A sliding inclosure of shatter-proof glass covered both cockpits completely, with an arrangement that permitted the rear section to be telescoped forward out of the gunner's way when in action.

In the fuselage, immediately behind the rear cockpit, in a locker, was the usual Barnes emergency equipment including a small outboard motor, a .45-caliber Thompson submachine gun, one Springfield rifle with a telescopic sight, and a repeating shotgun. There was also a mattock, a hatchet, a keg of water and emergency rations.

The radio installation was easily accessible between the cockpits, with duplicate controls on each instrument panel. The headsets were adaptable for use as intercockpit phones.

The whole world seemed to be alive with thunder as old Scotty gunned the twin Barnes-Diesels in the nose of the big ship. Then, after checking the infra-red ray telescope that permitted Bill to see through rain, fog and the dark of night, he cut the throttles and climbed out, his gray head nodding with satisfaction. He was as proud of the Lancer as Bill.

"She's sweet, boy," he said. "She sings a lullaby when you open the throttles."

"See if she can sing *Bei Mir Bist Du Schoen*, Scotty," Red Gleason suggested.

Some of the acute tenseness seemed to leave Bill Barnes' face as he joined the others laughing at Scotty's dignified discomfiture.

"All right, fellah," Shorty Hassfurth said as he saw Bill's glance sweep anxiously about, taking in the hangars, airplane factory, administration building,

hospital and even the fire house. "Let's see you shove. And don't stick your homely mug around here again for three weeks."

"That's right, boy," Scotty said. "We'll take care of things. You'll keep in contact by radio and cable?"

"By radio and cable," Bill said. "I gave Tony Lamport instructions this morning." Tony Lamport, a black-eyed, Italian-American, was chief radio operator and superintendent of communications on Barnes Field.

Climbing into the forward cockpit, Bill suddenly asked, "Where is that brat, Sandy?"

Sandy had completely disappeared. But a moment later he came tearing around a corner of the administration building, his white helmet and overall flapping. "I forgot my autograph book," he panted as he scrambled into the after cockpit. "I'll probably have a chance to get some swell signatures in England."

"Do you want my autograph before you go, Nimrod?" Shorty yelled.

"Sure, mister." Sandy opened the little black book and thrust it over the side.

Shorty looked at him suspiciously, then wrote his name on the page Sandy had designated.

Sandy took the book back, tore out the page, folded it and threw it at Shorty. "See if they'll let you in the zoo with it!" he shouted. "Let her ride, Bill."

Bill's hand came above his head in farewell salute as Tony Lamport gave the all-clear signal. He released his brakes and the gleaming, silver ship rolled down the runway. At the center of the field, where the runways converged, he tapped the rudder to kick it around into the wind and whipped it off the ground with his characteristic touch. The landing-gear light on the instrument panel gleamed as the amphibian gear folded completely into the fuselage and wings, and what had been a sesquiplane became a silver bullet that was a monoplane.

II—S. O. S.

A LITTLE over three hours later Bill shot a "sun sight" as the tip of Cape Race flashed under the wings of the Lancer. He eased back his engines to about sixty-five per cent throttle as a twenty-mile tail wind came out of the west.

Every half-hour he had been talking to Tony Lamport on Barnes Field, giving him his position and the weather so that Tony could check it against the forecast. At the same time Tony took a radio bearing to cross-check the position Bill gave him.

"You're going to run into a couple of high fronts pretty quick," Tony told

him as St. Johns faded away behind them.

"Okay, Tony," Bill said. "I'm going to throw the controls to Sandy if he isn't asleep. He'll check with you."

"BBX signing off," Tony said.

"Want me to take her, Bill?" Sandy asked.

"Just a minute." Bill checked their fuel consumption, climbed to fifteen thousand feet and increased their speed forty miles an hour to get maximum efficiency. "You'll get a wind shift before you strike that first cloud wall," he then said. "If it gets bad wake me up. I'm going to sleep."

"I've got her, Bill. I'll take radio bearings if it closes in. Sweet dreams."

An hour later Sandy stuck the nose of the Lancer into a front, or cloud wall, that rose to twenty thousand feet from the surface of the Atlantic. Black rain that was half hail beat down on the overhead hatches, and a sudden gale snatched them, buffeting the Lancer around like a cork on an angry sea.

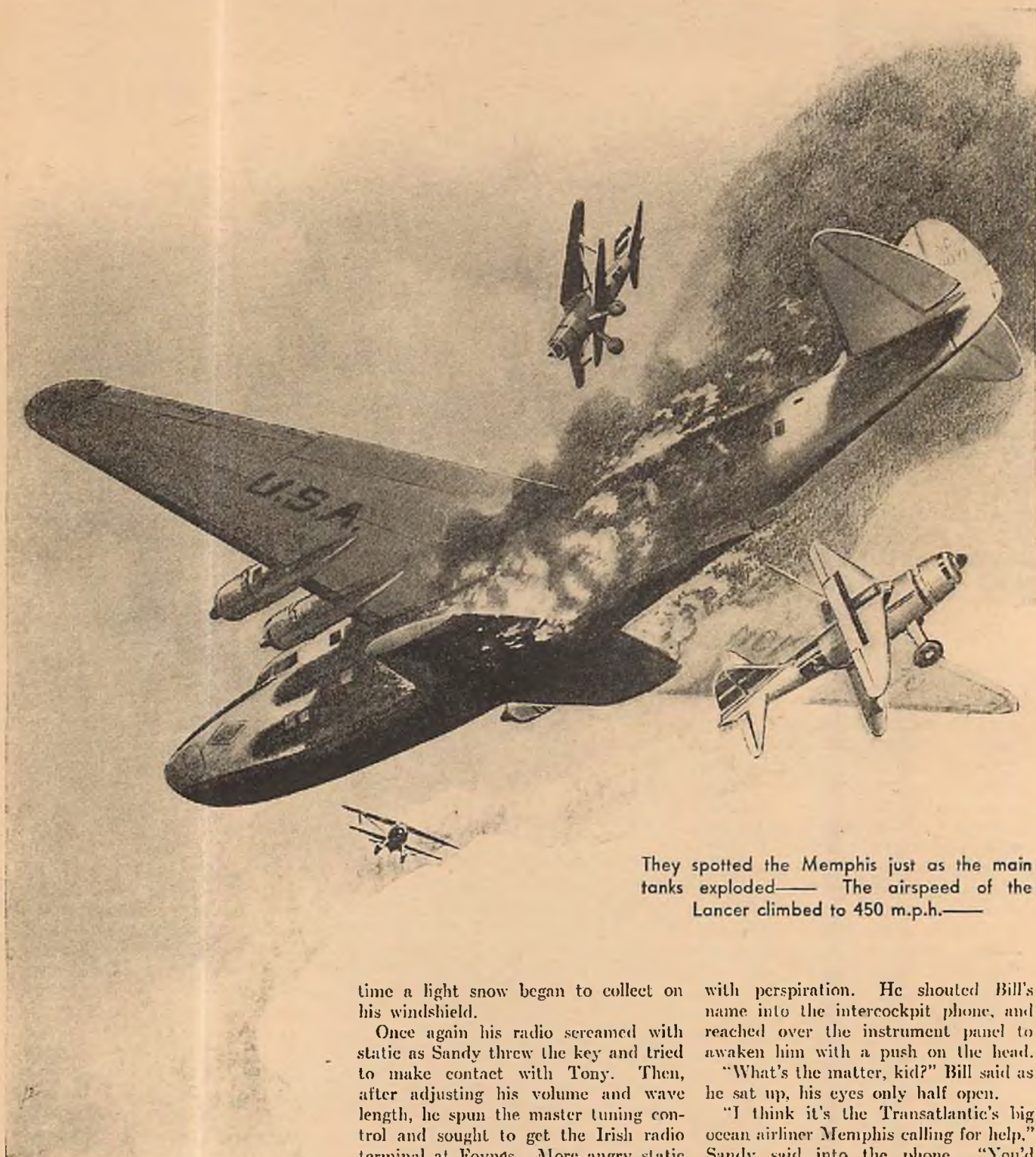
For a moment Sandy debated about waking Bill; decided against it. From the dials on the instrument panel came a ghostly phosphorescent glow. He could barely see his navigation lights far out on the wing tips. A wrench and a twist dropped the big ship three hundred feet. Then it glided up an ascending current of air and down again, as though its belly were attached to the rails of a roller coaster.

Sandy flipped his radio switch and began to chant Tony Lamport's call letters into the microphone. The wail that came back to him was like the eerie screams in a melodramatic movie. He closed the key with eyes roving over his instrument panel and coming to rest on his artificial horizon. His arms ached from trying to keep the big ship steady on her course. He was fighting a crosswind that made him take his bearings every few minutes.

The storm had swallowed them up completely, locking them tight in a world that was a mass of ominous fog and wind and driving rain. The wind was slashing in against the windshield so hard he could not see two feet in front of him. He was flying entirely blind and fighting his controls every instant.

In the forward cockpit Bill Barnes was sleeping the sleep of a man who has left his worries and nervous tension behind him. Not even the fearful buffeting the Lancer was taking could disturb him.

Almost without notice the Lancer popped out on the other side of the front, and Sandy found that the wind had shifted two hundred and forty degrees. But now there were clear, sunlit skies ahead with an almost unlimited visibility. He nosed the Lancer down



They spotted the Memphis just as the main tanks exploded— The airspeed of the Lancer climbed to 450 m.p.h.—

in a long power glide, hoping to pick up a more favorable wind at a lower altitude. Flipping his radio key, he made contact with Tony Lamport and checked his dead reckoning navigation against the Barnes Field radio station. He was glad that he had not awakened Bill.

But after two hundred and eighty miles of sunshine another front loomed up ahead. Sandy raised the nose again, trying to get above it, but the ominous mass seemed insurmountable. Leveling off at twelve thousand feet he began that same desperate fight all over. This

time a light snow began to collect on his windshield.

Once again his radio screamed with static as Sandy threw the key and tried to make contact with Tony. Then, after adjusting his volume and wave length, he spun the master tuning control and sought to get the Irish radio terminal at Foynes. More angry static was the only answer.

Suddenly he leaned forward, tense and eager, as the faint, far-away sound of a high-pitched, desperate voice came to his ears. Feathering the control, he strained to hear what the voice was saying. One time it sounded like a general S. O. S., but he wasn't sure. Then the words, "Transatlantic Airliner Memphis calling. . . . Transatlantic Airliner Memphis calling. . . . we are falling. . . . they are pouring in. . . ." Then the voice rose and faded away into an eerie scream as static intervened.

The palms of Sandy's hands were wet

with perspiration. He shouted Bill's name into the intercockpit phone, and reached over the instrument panel to awaken him with a push on the head.

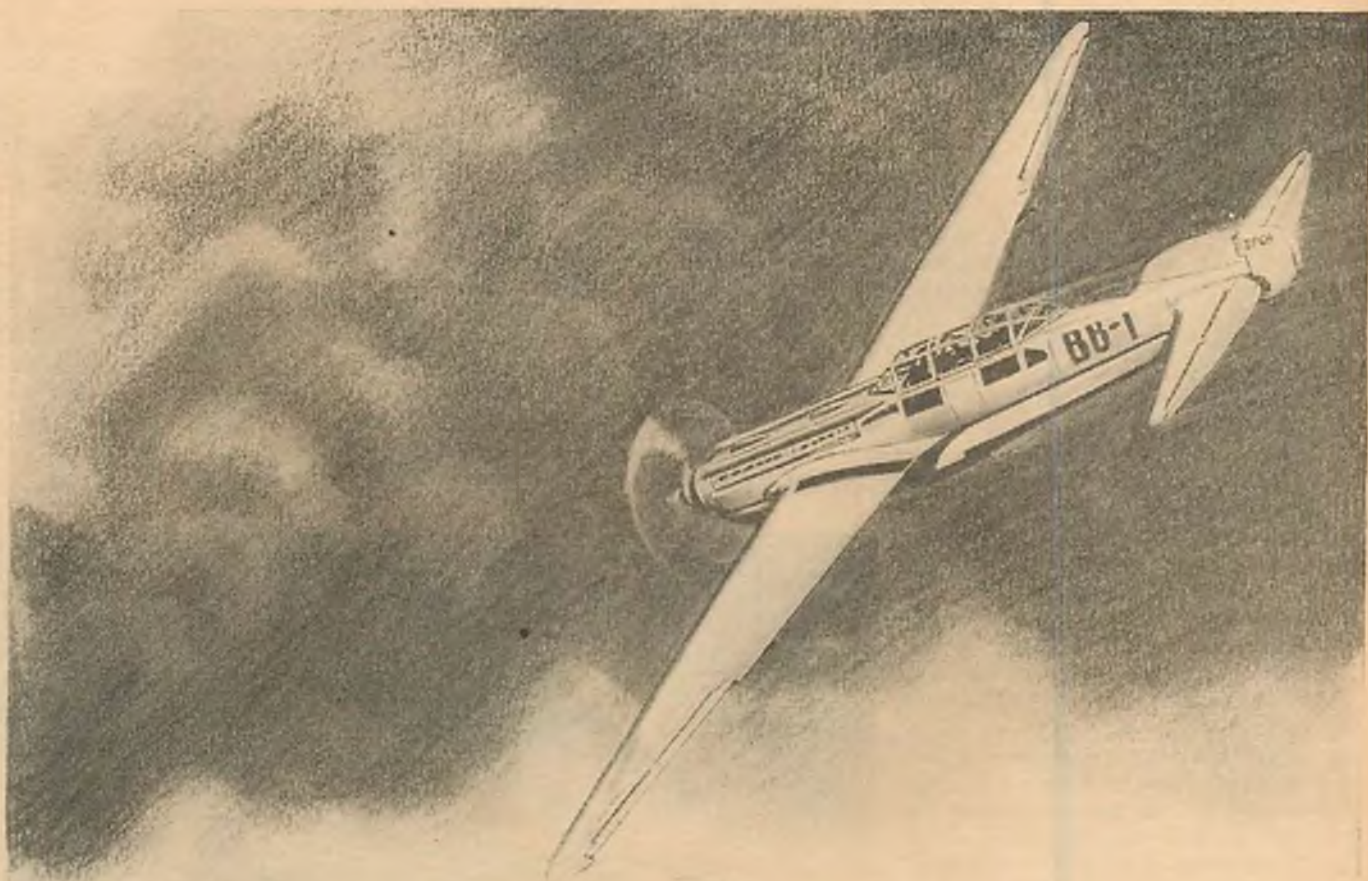
"What's the matter, kid?" Bill said as he sat up, his eyes only half open.

"I think it's the Transatlantic's big ocean airliner Memphis calling for help," Sandy said into the phone. "You'd better tune in and see if you can pick her up. There's so much static I couldn't hear what her radio man was saying. But she sounded as though she was in distress."

"She was scheduled to leave Foynes this morning," Bill said. "It's her first passenger-carrying trip after all those test hops. What wave length did you have?"

"I'm not sure, Bill. Some place around 1480. You'll have to tune to get her."

For the next fifteen minutes Bill worked with the radio while Sandy fought the Lancer and the weather.



"I can't seem to get her," Bill finally admitted. Then, "Wait a sec! He's coming in but I can't hear what he says." Quickly he chanted into the microphone: "BB answering Airliner Memphis. . . BB answering Airliner Memphis. Are you getting me? Are you getting me? Go ahead . . . go ahead. BB answering Airliner Memphis."

The scramble of words that followed was unintelligible to Sandy, because he was using all his powers of concentration to keep the Lancer on an even keel, but Bill's expression showed that some of the meaning had come through to him.

"Quick, kid!" he snapped at Sandy after motioning him to throw his radio switch and use the intercockpit telephone. "Give me the controls. She's in trouble, but I can't make out what. Something has happened to them. They can't make contact with any ships or land stations. He was sending out their position. I think I got it. Check our position and check theirs against it." He handed Sandy a piece of paper with the position of the Memphis written on it. "Work fast, kid! It sounds as though we are the only ones who picked up their S. O. S."

Bill poured soup into the mighty power plants in the nose of the Lancer and hung her on her props to take her above the storm and head winds she was fighting.

He tried again to pick up the enormous airliner that was on her maiden voyage across the Atlantic with passengers. But only the screech of static and complete silence came back to him.

III—TRIPLE ATTACK

THE GREAT AIRPORT at Bundorick Head in the mouth of the Shannon on the east coast of the Irish Free State was a place of indescribable activity on that morning. Everywhere men were in action: engine mechanics, machinists, traffic men, dispatchers, radio inspectors, porters, pilots, engineers, navigators and officials.

A loudspeaker blared from the administration building of the Transatlantic Transport Airways to add to the excitement.

"The Airliner Memphis will leave on her first passenger-carrying trip for New York City, U. S. A., in fifteen minutes. Have all passengers had their luggage weighed and put aboard? Have all passengers had their luggage weighed and put aboard?"

There was intense excitement in the air. It crept under people's skins and brought a flush to their cheeks and sometimes a ripple of aimless, senseless laughter to their lips. The official passengers and their friends and families stood gazing through the gates at the enormous monster in the water beside the quay. Tears and laughter inter-

mingled as the sun crept higher and higher into the heavens.

The four twin-row, radial, air-cooled Meredith Vulcan motors increased their crescendo as Flight-Engineer Hawkins spoke over the telephone to the first pilot and to the four men stationed in the engine nacelles.

The captain, Arnold Morton, a veteran flyer with twenty-five years of experience behind him, licked his lips nervously as he went down the gangway from the bridge to the anchor and gear room in the nose of the great forty-five-ton ship for a last inspection. He glanced at the mooring post through the open hatch and over the neatly arranged gear that was ready for any emergency, then returned to the bridge. Nodding grimly to the first and second pilots at their posts at the controls, he went through the sound-proofed room to the navigation and radio room behind it. There the radio officer, flight-navigator and flight-engineer sat at their desks with earphones clamped to their heads.

Giving only a few moments to the cargo hold, crew's quarters and baggage compartment, Captain Morton proceeded to the galley and dining lounge and the seven passengers' compartments stretching along the length of the ship.

The furniture was made entirely of duralumin to keep down its weight, and the windowpanes were of a plastic lighter than glass. The walls were cov-

ered with porous fabrics so that the sound waves would pass through them instead of being deflected. The fabrics were colored light green, beige and light blue, and had the effect of making the compartments spacious and airy without being too bright in the sunlight above the clouds.

In the de luxe compartment in the tail of the ship was a cocktail table and a bookcase beside a long, low couch. The ladies' and men's washrooms were equipped with leather-covered stools and bright duralumin fixtures.

From the passenger compartments Captain Morton went down into the hull, where a gasoline pump drove gas from the sponsons up into the wing tanks and engines, and where auxiliary cargo was stored. A hasty inspection here, and he returned to his office. Sitting in the chair behind his desk, he closed his eyes, his lips moving silently.

He was back out on the bridge as the big silvered-hull monster cast off and taxied across the mouth of the Shannon for a take-off, great geysers of water cascading upward on each side of the hull as it cut down into the wind.

At precisely the measured time for the hull to leave the water, the enormous high-wing monoplane zoomed upward and took to the air with its engines bellowing at ninety per-cent throttle.

"Wind ten miles, thirty degrees," the navigator advised the skipper from his post in the celestial observation turret.

"Best altitude twelve thousand feet," he said a moment later.

A half-hundred monoplanes and biplanes fell into position beside the giant transport to escort it out to sea as the first pilot cut his throttles to cruising speed.

The flight-engineer began a check of the engines from his swivel chair in front of the control board, as the gasoline consumption at take-off was tallied. All compasses were checked and compared as the flight-navigator took a "sun sight" to be sure they were true. The flight-engineer reported the amount of fuel aboard to the captain, and the captain checked their progress against the gasoline consumption.

Every half-hour the radio operator tapped out a position report to land stations, while the navigator checked the ground speed by celestial observation.

At the same time the radio operator got a radio bearing from the nearest land station, to cross-check the work on board the Memphis. In the meantime the shore station had apprised itself of the positions of all surface ships within two hundred miles of the plane's position and route, and had transmitted it to the skipper and navigator so the Memphis could obtain radio "fixes" from them.

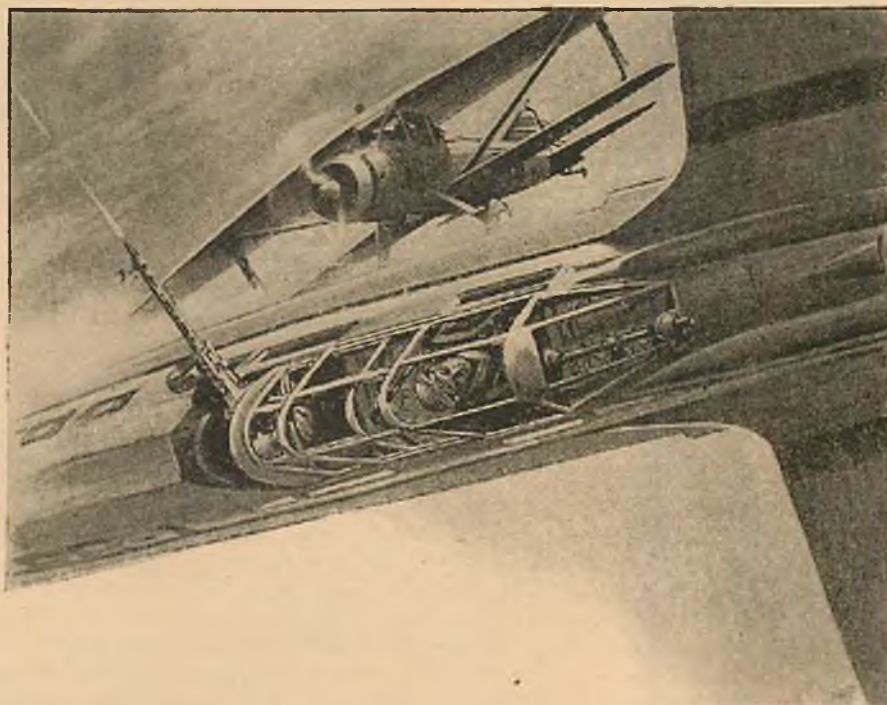
Every thirty minutes the skipper and

the first pilot relieved each other at the controls. And the flight-engineer and his assistant relieved each other, too, in the regulating of the pumping of fuel from the hull to the wing tanks and making up a log by repeated checks on their one hundred and forty-one instruments.

From the skipper down to the galley stewards, the ship was being manned with a precise efficiency that left nothing to chance. The men worked silently with a crisp confidence that conveyed itself to the passengers. On this maiden trip those passengers were all officials of the Transatlantic Transport Airways and a sprinkling of reporters and scientists, and the twenty-five aboard repre-

the sound when the pilot of that first ship clamped down on the trip of the two machine guns synchronized through his propeller.

He had aimed at the back of the neck of the flight-navigator in his navigation turret on the roof of the fuselage. The bullets chopped into the duralumin skin of the big ship and crept forward as the flight navigator lifted his head at the sound of the diving motors. He never saw what was behind and above him because a hail of lead nearly tore his head from his shoulders. He slumped off his little platform and his sextant clattered to the deck, while the bullet line continued forward and tore into the body of the radio operator



"Give it to 'em!" Bill said into his microphone, hearing Sandy's swivel gun chattering behind him— He yanked the control stick back into his stomach and hung the ship on its props—

sented only half of the ship's capacity.

Three hours out, cruising at twelve thousand feet, the Memphis ran into the first fronts dotting the air above the Atlantic that morning. The big ship flew through the fog and rain with scarcely a tremor to indicate that it had gone from fair weather into foul. The passengers were more interested than frightened by the fog curling along the sides and the rain slashing against the windows. They were air-minded and they had perfect confidence in Captain Arnold Morton and his crew.

Captain Morton was munching a sandwich in his little office, when the first of those three dun-colored, low-wing, tear-drop biplanes came diving out of the fog above the giant transport. The roar of their motors came to the captain's ears faintly and he was just getting out of his chair to investigate

and the first pilot, who was at the controls.

As that first dun-colored biplane raced above the nose of the big ship at terrific speed, the second biplane came out of the fog with its guns yammering.

Its bullets tore into the top of the Memphis a little to the left of the trajectory of the first ship. Captain Morton had opened his mouth to bellow an order when those bullets tore into his back. They slammed him against a bulkhead where he slumped to the floor, his arms and legs grotesquely spread.

The assistant radio operator leaped to the blood-spattered microphone as he saw the chief operator slide out of his chair. He tried desperately to make contact with the nearest land stations and ships, but the radio apparatus seemed to be smashed beyond control. He began to chant incoherently into his

mouthpiece, sending out a general call for help. No specific station answered him, but he kept giving the position of the Memphis and trying to tell what was happening, although he did not know.

A steward had been carrying a tray of food from the galley to the dining saloon when that first long burst of fire drove into the body of the first pilot. Before the second pilot had grabbed the controls, the big ship lurched and the steward landed in the lap of one of the vice-presidents of Transatlantic Transport Airways.

The next instant the passengers went mad. The third dun biplane had dived in below the tip of the port wing and was spraying the middle deck that contained the passenger compartments with a withering fire of lead. One moment the guests were chatting gayly, the next a quarter of them were dead. The faces of the rest were twisted into weird masks, and in their eyes was the fear of death. They bellowed and screamed like caged, angry animals, while the second pilot fought the controls and tried to right the ship.

After a bit the Memphis plunged out of the wall of fog that had encompassed it. The three dun biplanes climbed above it and drove incendiary bullets into the wing tanks. A tank exploded and the whole ship was engulfed in a great mass of smoke, out of which a giant tongue of flame leaped upward.

Then one of the biplanes was diving underneath the Memphis, firing round after round of incendiary bullets at the sponsons containing the main gasoline supply. For some reason this attack failed to bring about the intended holocaust, and the pilot circled and returned for another try.

Suddenly, rivers of flame seemed to pour out of the big airliner from wing tip to wing tip and down the length of the entire hull. It became a fiery furnace of exploding tanks and twisted, white-hot metal struts as it plummeted to its death in the calm Atlantic.

IV—TELLTALE MANEUVER

BILL BARNES watched the instruments on his flight panel as he held the Lancer hard into the rain and fog and tried to climb above them.

He could not tell from the garbled message from the Memphis' radio operator exactly what was happening, but he knew the ship was in imminent danger. He eased his throttles open until the Lancer was racing through the storm at nearly four hundred miles an hour. And it took all the strength in his powerful arms and shoulders to hold her on her course.

"Fasten your safety belt and adjust your parachute, kid," he said into the telephone to Sandy.

But Sandy had already done that.

He gasped, "Wonder how bad it is, Bill?"

"No telling," Bill said. "We ought to be coming up alongside them pronto if that position was correct."

Then the Lancer sped out of that dense fog, and they were out in the open with the sun shining brightly in the blue sky above them and the Atlantic like a mill pond far below.

Twenty miles away and far below they spotted the Memphis just as the main supply tanks exploded. A string of curses leaped to Bill's lips as he saw bursts of fire coming from the three dun biplanes darting in and out around the airliner. He opened the throttles of the Lancer wide, saw the airspeed indicator climb to four hundred and fifty miles an hour. Nursing his machine-gun trip, he fired a short burst to be sure his guns were ready.

"What's happening, Bill?" Sandy panted into his microphone as they saw the Memphis become a great ball of smoke and flame and start her plunge toward the sea.

"Break out that swivel gun!" Bill said. "Those three biplanes have murdered the Memphis and all her crew and passengers. They'll come after us now because we saw them."

He nosed the Lancer down, pointing it at the flaming mass ahead, hoping against hope that there might be some survivors, though realizing in his heart that no one could survive that flaming hell. He eased out of his dive as what remained of the Memphis struck the surface of the water. One final explosion occurred, followed by a half dozen minor ones, and then the skeleton of the giant ship plunged to its last resting place.

Bill circled low above the great oil spots spreading over the surface, trying to locate a possible survivor. But there was none. He was placing his binoculars back in a pocket when the sound of screaming props struck terror through his whole being. For an instant he was motionless. Then his eyes swept the sky above him as Sandy shouted, "They're diving on us, Bill!"

The three fast, tear-drop biplanes were converging on them from three sides! They were only three hundred yards above him and traveling at terrific speed. He yanked the control column of the Lancer back into his stomach and hung it on its props. The three diving ships were easing out of their dive to come up underneath him as he poured juice into the engines of the Lancer and took it upstairs.

"Give 'em hell, kid!" Bill said into his microphone, hearing Sandy's swivel gun chattering behind him.

He leveled off a thousand feet above the three biplanes and came around in a vertical bank as they nosed up to form a Vee. His finger hovered over

the electric trip of the 37mm. cannon. Suddenly, he opened up the throttles of the Lancer for a moment and went up and back in a flashing Immelmann turn as the three biplanes leveled off. They were coming at him head-on now. When they were four hundred yards away they opened fire with their six machine guns. The concentrated fire was terrific.

Bill skidded the Lancer out of range and eased back on the stick as the three ships passed by him. As he saw their rudders bite into the air to return to the attack, he yanked the stick back and came up and over on his back just as they began their turn. At the top of his loop he neutralized his controls for a moment, then eased the nose down in a steep inverted dive.

He got the first of the three ships under his hair sights for one brief instant. His finger came down on the trip of his 37mm. cannon. The rapid-firer threw five high-explosive shells within the space of a second, but Bill's speed was too great and his dive too steep for accurate shooting. Between the time he had the ship under his sights and when he tripped his trigger the little fighter had passed out of his range of fire.

Bill cursed, leveled off and half-rolled the Lancer upright. The single scaters were coming around on one wing tip as he lifted the nose for altitude. He knew he could get away from them if he wanted to, but the thought of the wholesale murder he had seen them perpetrate had enraged him almost beyond reason.

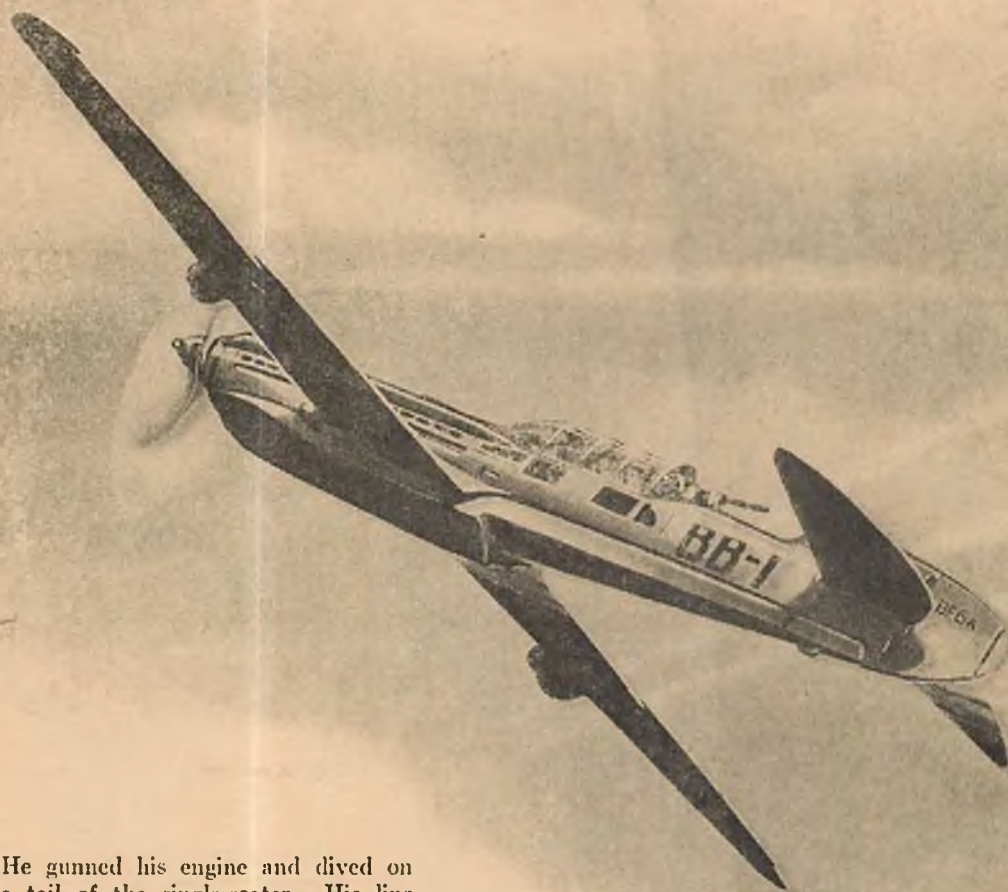
He knew he should broadcast what he had witnessed, but something held him back, something he did not understand.

"Why," he asked himself as he spiraled upward, "did they do it? What is behind it?"

His hand started forward toward his radio switch, to open it and tell the radio station at Foynes what had happened and ask them to send him aid. But something stopped him. Suppose, he thought, I lure these three ships in toward shore to meet planes that are sent out to help me, and in the mixup that follows they escape; then they will never get what is coming to them. They may escape entirely.

He was trying to justify his desire to give battle when he became aware of a screaming prop that roared underneath him. He rolled the Lancer completely over and whipped it up and around to reverse his direction. He dropped the nose and poured a burst of ten shells at the little dun-colored ship arrowing up at him. But again his aim was bad and the little ship kicked its tail in the air and dived out of danger.

"You don't have to make any decision," he said to himself. "If they want trouble give it to 'em!"



He gunned his engine and dived on the tail of the single-seater. His line of tracer smoke curled above the head of the pilot. He eased his stick forward a little and his bullets crashed into the tail assembly and climbed forward along the fuselage to the engine block. A half-dozen of those powerful .50-caliber bullets nearly tore off the pilot's head. He slumped forward over the stick, while the ship kept straight on toward the waters of the Atlantic.

And then the air seemed to be choked with slashing, roaring dun-colored biplanes as the other two fighters came back into the battle. Bill realized instantly that these fellows knew their jobs as combat pilots. They were like darting hawks as they converged their fire to get Bill between them. They were everywhere, charging in from all angles, their guns screaming lead.

Bill's mind and muscles had to coordinate with the speed of light if he were to survive that terrific onslaught. He eased the throttles of the Lancer open another notch and took it through the air with the speed and fury of a flaming meteor. He saw his bullets tracing designs on the sides of the dun biplanes, but his own speed was too great for accurate shooting.

He felt the Lancer buck and shiver as bullets drove into it from that never-ceasing hail of lead. But he fought on while he gasped for breath, his face

tense and terrible in its absolute concentration on the horrible job before him. He whipped the Lancer up and down, skidded and side-slipped, zoomed and dived and rolled to avoid the fire of those two fast fighters. He knew, only too well, that one single error in judgment would be his last.

He could hear Sandy's gun chattering at intervals as he drove them off his tail and he could hear Sandy complaining in his ear that he, Bill, never gave him a chance to get in a telling shot.

"Can't you level off and give me a straight shot at 'em once!" Sandy pleaded.

"I can't, kid," Bill gasped. "They are almost as fast as we are and they have as much maneuverability. I can't give 'em a chance to get set or they'll get us. They'll smash you into bits if I do."

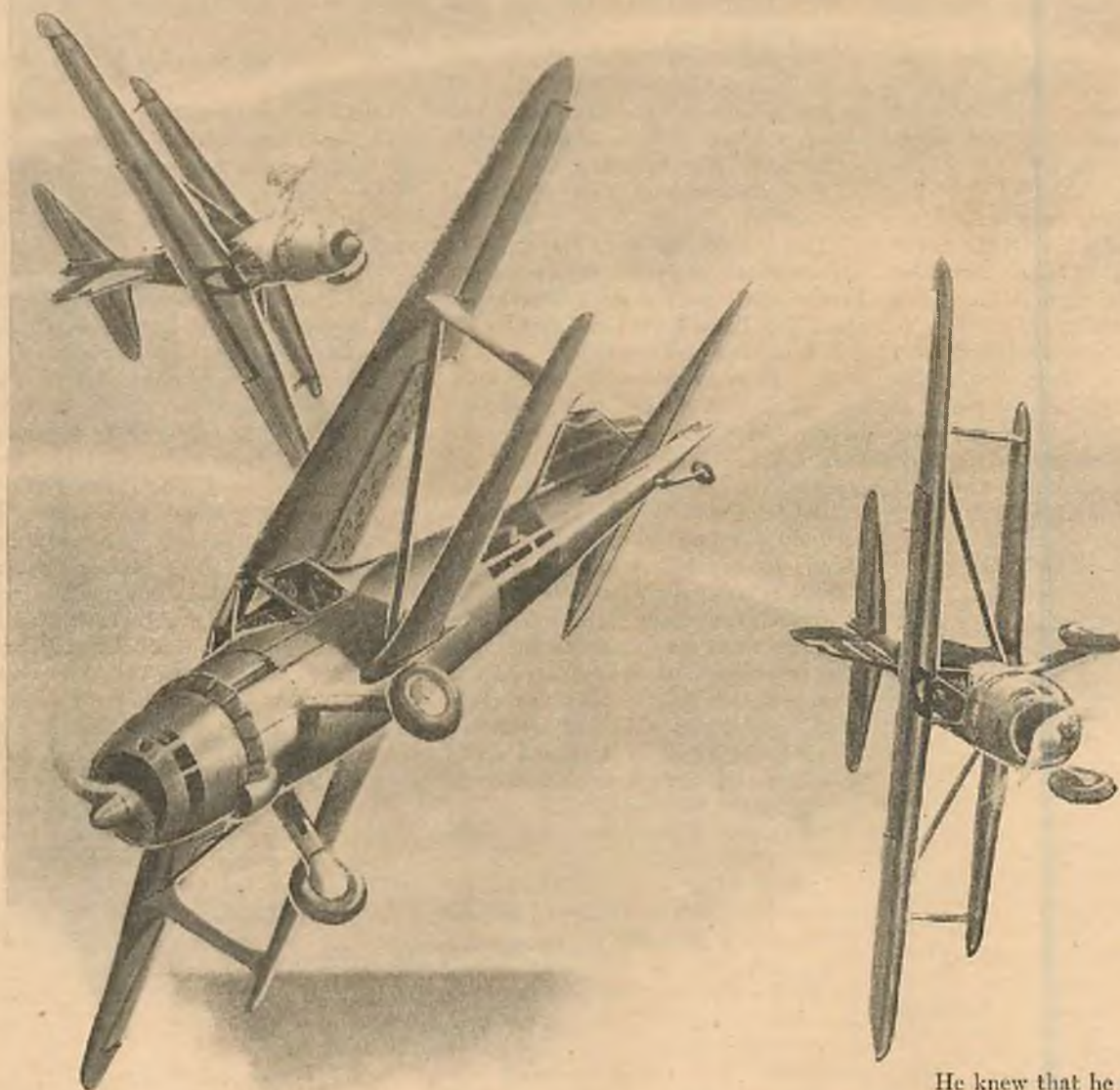
Then the two ships got him inside a tight circle that he could not break. Each time he tried to break out a terrific burst of fire would cut across his path, forcing him to deviate from his course, and then they would be on him again, forcing him back so that one of them could get him under his sights.

Bullets drummed all around them, and Bill's breath was coming in quick, agonized gasps. His right hand seemed to be frozen to the control column, so tight was his grasp. He was using all his inherent genius as a flyer, getting the utmost from the Lancer's great speed and maneuverability, while Sandy desperately tried to keep the enemy off their tail.

Then the two ships began to tighten the circle again, their guns spewing fire and lead and death. Bill waited until they almost had him between a cross-fire. He waited until one of the biplanes became overconfident. Then, for that brief moment that is enough, he got the dun ship under his sights. His finger clamped down on his 37mm. gun. He fired a burst of five shots as he pushed the throttle of the Lancer wide open and nosed down in a power dive.

The dun biplane became a great mass of black smoke and orange flame, the

The three fast, tear-drop biplanes were converging on them from all sides—— They were easing out from their dives when he poured juice into the engines——



explosive shells taking it apart with a finality that was appalling. The other dun ship zoomed upward to escape the shooting debris as it exploded.

Bill looked back and up as he pulled the Lancer out of its dive. The remaining biplane was diving on their tail, and Sandy tried to get him under the sights of his gun. As Bill began a tight turn to the right, the other ship went underneath him and nosed up eight hundred yards away. Then they were roaring toward each other head-on, each striving to find the other under his sights.

When only fifty yards separated them,

the pilot of the single-seater suddenly swerved it in fast to the left for a death-dealing burst of fire just before they passed. Bill shouted, involuntarily, then threw the Lancer out of its mad path to avoid the crash that for an instant seemed inevitable.

Bill yanked back on his stick and zoomed the Lancer up and over on its back, while the biplane continued on its course. At the top he half-rolled level and gazed over the side. His face was white and his eyes were wide with disbelief as he watched the dun ship flip over and come back. He couldn't believe what he had just seen and yet he knew it was true.

He knew that he had come in contact with only one man during all his aerial combats who used that particular swerve in to the left before he tripped his guns. And that man was his most deadly enemy. Yanking back on the control column, Bill took the Lancer high into the heavens as the tear-drop biplane tried to come up beneath him. He wanted to get some place where he could think. He took the Lancer steadily upward until his altimeter read 25,000 feet.

"Hey, Bill!" Sandy shouted. "Where the—where are you going? That other ship can't get up here. He's wallowing!"

"I know it, kid," Bill said calmly. "Close your hatch and turn on the oxygen. I don't want him to get up

here. I don't want to shoot him down. I want to follow him and take him alive."

"Who is he?" Sandy asked. His voice was a combination of anger and disgust because they were peeling off in the middle of a fight.

"He's our old friend," Bill said. "And by a coincidence that is stranger than fiction he had another chance to try to murder me."

Through Bill's mind were racing a thousand and one thoughts. Only his own loyal men knew that he was flying the Atlantic that morning. It had been his men who had urged him to do it, even insisted. Had one or more of them betrayed him—got him out where he would be at the mercy of the man who hated him above all else?

"Who is he?" Sandy persisted.

"The man who calls himself the Saver of Souls," Bill said. "I didn't recognize his tactics until he came at me with that swerve, head-on."

And Bill was aware that his voice was unsteady and trembling. He watched the dun biplane slip down in a power glide, then dropped the nose of the Lancer to follow it.

"And this," he said grimly to himself, "is the beginning of my holiday!"

V—"HE MUST BE SILENCED!"

MORDECAI MURPHY, the man who had led that little element of three dun-colored biplanes on their murderous flight over the Atlantic that morning, sank into an overstuffed leather chair in the lounging saloon of his hundred-and-eighty-foot, oil-burning yacht *Haman*, as it moved silently out into the Irish Sea from the Isle of Man.

Riding low in the water, the *Haman* was as spick and span and trim as the man who owned her. She was passing the tip of Langness, that narrow strip of land, jutting into the sea, which divides Castletown Bay from Derby Haven, the airport, before Mordecai Murphy came out of his reverie and spoke to the florid-faced Wetherby Duncan, who was his companion.

"I will tell you what happened now," Mordecai Murphy said in his pleasant, cool way. "I'm sorry I was so abrupt when I came aboard. But I was in no mood to talk. I hadn't got over the amazing thing that happened to me today—the most amazing coincidence that has ever occurred to me. No fiction writer would dare to use it in a story."

"You destroyed the Memphis?" Duncan asked in a low voice.

"We destroyed the Memphis."

"Where are Chamberlain and Lorenzo?" Duncan asked.

"Dead," Murphy said, and his eyes were as hard and brittle as two pieces of ice. "Stop asking me so many bloody questions and I'll tell you about things.

I'm trying to figure how, or why Barnes happened to be out there."

"Bill Barnes?" Duncan asked.

"I told you something about my previous encounters with Bill Barnes, the American," Murphy stated.

Duncan nodded.

"It is uncanny," Murphy continued, half to himself. "I told you how I set a trap for Barnes over the Great Smoky Mountains in North Carolina?"

"Yes," Duncan said.

"Did I tell you that the man who lured Barnes down there where I could get an unhampered shot at him was a stock broker in New York who told Barnes he knew a man down there who owned a block of Transatlantic Transport stock?" Murphy asked.

"No," Duncan said, "you didn't tell me that."

"That," said Murphy, "is the way Transatlantic came to my attention. Barnes didn't get the stock because my agent shot himself the same day Barnes and I had our encounter."

"And Barnes came out on top?" Duncan said, and immediately regretted having said it because of the deep color that suffused Murphy's face, and because of the way his eyes froze.

"But later on," Murphy said, "Barnes got hold of a large block of it. Almost enough for control. I happen to know that he is having quite a task carrying it. That is one reason why I was willing to listen when you came to me with your proposition to make Transatlantic Transport look bad so that you could build up confidence in our own line, International Airways. I knew I would be killing two birds with one stone in destroying the Memphis."

"You said Barnes was out there today?" Duncan said.

"I did." There were two little creases between Murphy's worried eyes, and his mouth was a straight line across his strong jaw.

"We dove on the Memphis, riddling her with incendiary bullets," he went on after a moment. "She was falling in flames when Barnes suddenly appeared out of nowhere. I don't think he could have received a call for help from the Memphis herself because I studied her layout so carefully that I am sure I got the radio apparatus and the operator on my first dive. But there he was. He came down in a long power dive and circled above the Memphis as she struck the water. He was, probably, hoping to find some survivors."

"Were there any?" Duncan asked.

"Not a one," Murphy said, and there was no trace of regret in his expression. Rather, it was one of elation.

"And then?" Duncan said in his mad-denyingly cool way.

"He was too much for us," Murphy said. "That man is without a doubt

the greatest aerial fighter who ever lived. He is astonishing and he has the luck of—"

"His record doesn't sound as though there was any luck about it," Duncan said. "How did it happen he didn't get you?"

"I don't know," Murphy said frankly. "I learned my lesson in two encounters with him. No one can stand against him in the air. That is why I decided to leave him alone, at least in the air. There *must* be an element of luck about it."

"He shot down Chamberlain and Lorenzo?"

"He tore them and their ships to bits with his 37mm. cannon," Murphy said. He wet his dry lips with his tongue. "I was next."

"You're here," Duncan said, a smile flitting across his face.

"Only by the grace of God," Murphy said. "I admit that Barnes is my superior in the air now. But he won't always be. My day will come. . . . He came at me head-on, and I used a trick I learned from diving falcons. I have a room in my New York apartment where I train and watch them attack their prey. While I was getting ready for that combat with Barnes I learned that just before they strike their prey, after their dive with their wings wide and their talons spread, they swerve in to add force to their strike."

"I practiced the trick, keeping my ship out of line of fire of my opponent until just before we pass, when I swerve in to the left with my guns firing. At the last moment I zoom above him and then straighten out."

"You used that trick on Barnes over North Carolina?" Duncan asked.

"Yes, and I used it again today."

"Then what happened?"

"Barnes hung his ship on its props and took it upstairs," Murphy said. "So far upstairs I couldn't follow him. I began to wallow at 25,000 feet and I didn't have any oxygen so I started for the Irish coast."

"With Barnes following you?"

"Yes, but I lost him in a wall of fog just before I struck the coast. It was fortunate it was there or everything might have been different."

"Yes," Duncan said. "You would, probably, not be here. Barnes must have recognized that falcon trick and identified you. Either that or he didn't want to kill you because he wanted to know who you were. It might be either one. Does he know who you are?"

"He knows me only as the Saver of Souls," Murphy said. "He has tried to find out who I am before. That is why I decided to leave him alone for a while. I was afraid he would learn."

"What did you do with the fighter you were flying after you landed?" Duncan asked. His eyes were worried

now. As the head of International Airways, a competitor of Transatlantic Transport in the flying of passengers and cargo from Europe to the Americas, he could not afford to be mixed up in any way with the villainous plot he had brought to Mordecai Murphy to execute.

Like a host of other men all over the world, he was indebted to Mordecai Murphy, the man who called himself the Saver of Souls. And like those other men whom Murphy had snatched out of jails and dungeons and the jaws of death, Wetherby Duncan had learned that Murphy did not do his saving for



One of the tear-drop biplanes—

humanitarian reasons. Instead, he had learned, Murphy had saved him, as well as all the rest, to serve in his astounding mill of evil.

"I did what I had planned doing with all three ships," Murphy said. "I bailed out after I had locked the controls so that it would dive into the Irish Sea off Maughold Head. Sneed was waiting there in a car to bring me down to Castletown."

"You're sure you lost Barnes?" Duncan asked anxiously.

"Certain," Murphy said. "But how did he happen to be there? If he had been engaged to convoy the Memphis across the Atlantic we never would have got a crack at it. He would have been on us before we could fire a gun. There is a chance that he just happened to be flying above the North Atlantic and picked up an S. O. S. from the Memphis. But if he did that why didn't the shore stations get it? The only word that has come out about the Memphis up to now is that the land stations suddenly lost contact with her. After so many hours destroyers and planes were sent out to look for her, but the theory is that for some reasons her radios went bad."

"They'll know better after Barnes talks," Duncan said.

Murphy leaned over and snapped a button on a small radio that was built into a bookcase. He twirled the dials for a moment as he looked at the watch on his wrist.

"—interrupt our program," a voice said through the loudspeaker, "to bring

you further news about the Airliner Memphis of the Transatlantic Transport Airways that left Ireland this morning on its maiden voyage with passengers and cargo. The planes that were out searching for her had to return to their bases when night overtook them. But a half-dozen destroyers and other ships that were in the vicinity of the position she was last heard from are speeding toward the spot. It is still hoped that only her wireless has gone out of order and that she is continuing on her journey to New York, although captains of ships along her route say she has not passed above them. Of course, she may be flying high to avoid the areas of fog that are forecast along her regular course. We will bring you further news about the Memphis as soon as it is received. This is—"

Murphy clicked off the radio and a little smile curled the corners of his mouth. "They'll have to do a lot of searching," he said. "A few things that wouldn't sink may have escaped the fire, but not many. They'll find patches of oil and come to the conclusion that something caused an explosion and that she was lost with all hands aboard."

"Until Barnes talks," Duncan said dryly.

"But he hasn't talked yet," Mordecai Murphy said. "And I don't think he ever will. He doesn't like publicity and he works as a lone wolf a great deal of the time. He only has four flyers working with him since Hawkins and Henderson were killed. You see, he has a pretty big interest in Transatlantic Transport himself. If the stock begins to toboggan because of the loss of the Memphis it is going to hurt him. He will have enough sense not to talk until he has proof of his story. He knows his story will be discredited because he is a large stockholder in Transatlantic. He knows the newspapers would laugh at him if he said that he just happened to be flying the Atlantic and saw the ship shot down in flames. A thing like that could happen only to a man like Barnes. But people wouldn't believe it unless he has conclusive proof. That's why he isn't talking yet."

"But he will talk," Duncan said. "If he recognized you by that flying trick you spoke of they'll comb the earth for you and they'll find you. This isn't any little personal fight between you and Barnes. It's an international incident. It's like those mysterious submarines that were sinking shipping in the Mediterranean that aroused the whole world and brought half the sea power of the world there. You don't seem to realize that it is a big incident. It—"

"Sh—" Murphy said, extending the palm of one hand outward. "You talk too damned much, Duncan. I told you I did not believe Barnes would ever talk. I'll tell you why: I have a dozen

agents waiting to inform me where Barnes has landed, in both Ireland and England. Sneed, my secretary, made contact with them as soon as I landed this afternoon and gave instructions.

"I am expecting to have word from one of them at any minute. When I know where Barnes is I will take steps immediately to seal Barnes' lips forever. I would rather do it myself, in the air. But that is not feasible now. I'm not asleep, Duncan. I have never been caught napping. If I had been I would be dead or in jail. And," he added as an afterthought, "so would you."

Duncan's face became even more florid than it had been and it took no little effort for him to hold back the words that sprang to his lips.

"I see," he said finally. "We'll both hang if you don't succeed. He has got to be silenced."

"He will be silenced. And International Airways will have the bulk of the Atlantic trade. Transatlantic will never be able to recover from the blow."

"That was our idea," Duncan said quietly. He got to his feet, crossed the lounge and picked a book up from a table. He turned the pages until he came to the place where he had stopped reading and sat down again under a light. But he did not read. His eyes kept straying from the words before him to the face of Mordecai Murphy, and he could not help thinking that Murphy was a most amazing man.

The world knew that Mordecai Murphy was a paradox. The people who knew him knew that one moment he could be a person of rollicking good humor who bellowed peals of hearty laughter, and the next he could freeze them and make them feel as though they had ice water creeping up their spines.

No one knew anything about his antecedents. His enormous wealth was supposed to have come from South American oil and emeralds. He was said to have a finger in affairs in every part of the world. But no one knew which finger or which part of the world. He had been decorated by three nations during the War for his air feats. It was known that he made his home aboard the *Haman* when he was not visiting one of his half-dozen homes scattered around the globe. Many items appeared about him in the press. But never anything definite. He was truly a man of mystery.

He traded in men, making them his tools. His files were filled with dossiers on a long string of men whose destiny he once held in the palm of his hand. Men he had saved from paying the penalty of their crimes. Men who had promised him great promises in return for his seeming acts of charity and kindness. To them he had been the great emancipator. The Saver of Souls.

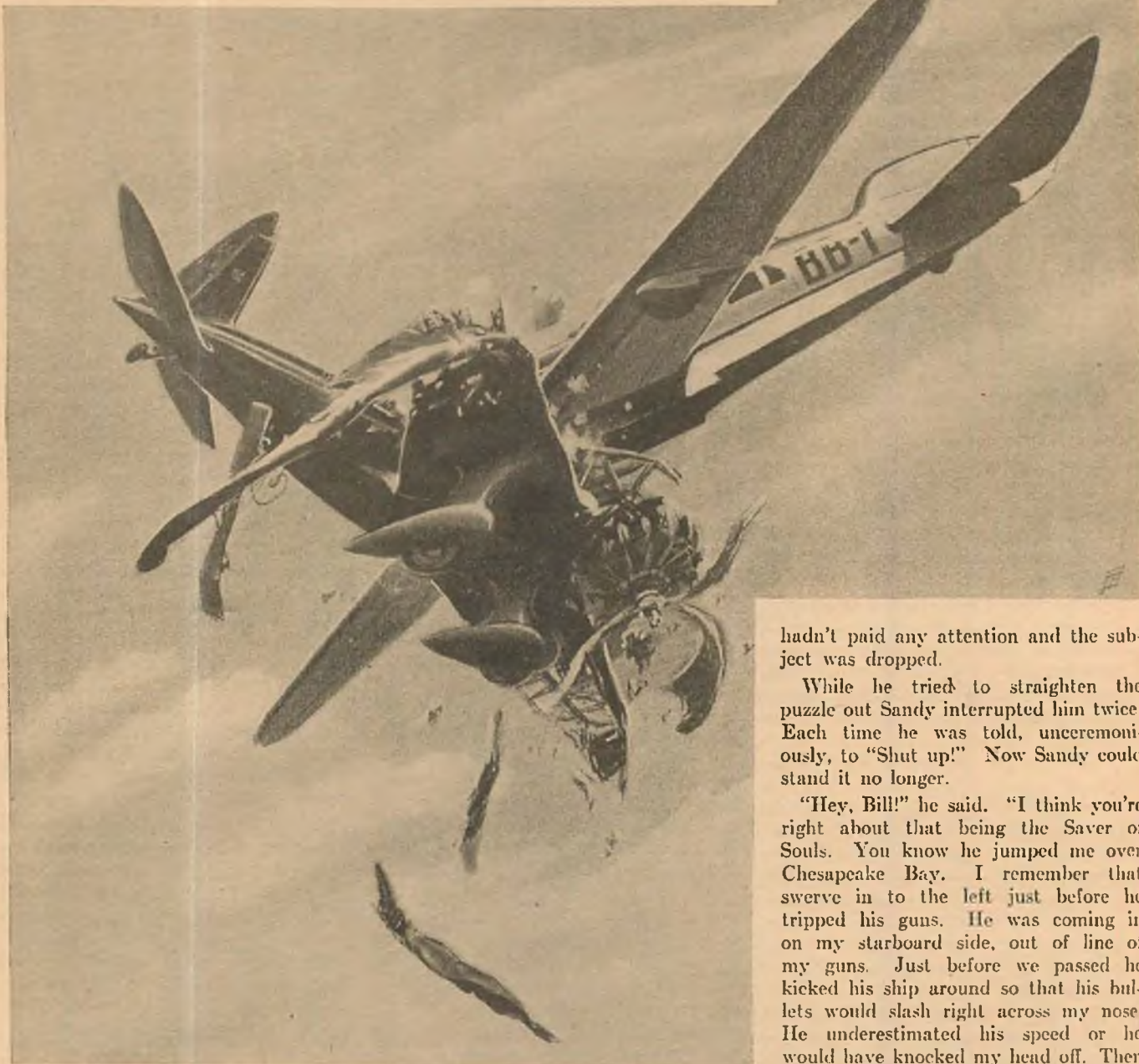
But most of them knew now that he had saved them that he might force them to help him with his nefarious enterprises.

VI—BOUND FOR CROYDON

AS BILL took a position eight thousand feet above and behind the dun-colored amphibian he tried to piece

phis? Had he, in some mysterious manner, been instrumental in arranging things so that he could get another chance at Bill far out over the lonely Atlantic? Had he thought that with the aid of the two other planes he would be successful? Did the fact that Bill owned a large block of Transatlantic stock have anything to do with the

The crash was like a mighty clap of thunder— For one terrible moment they hung together, then fell away—



together some of the startling facts that were racing through his mind.

When he thought back to the two encounters he had had with the man who called himself the Saver of Souls, he remembered that his tactics and strategy in combat were identical with the tactics of the pilot below him. There could be no doubt he was the Saver of Souls, the culprit who had plotted on two occasions to murder him.

But why had he led those other two planes in the destruction of the Mem-

set-up? Had he in some way been able to influence Bill's men on Barnes Field so that they sent him out to be murdered without knowing what they had done?

All these possibilities flitted through Bill's mind, but he could not fit them together. The thing didn't make sense. He had anticipated making contact with the Transatlantic Airliner Memphis a little later in the day, but no one except himself knew that. He remembered that he had mentioned something of the sort to Scotty MacCloskey. But Scotty

hadn't paid any attention and the subject was dropped.

While he tried to straighten the puzzle out Sandy interrupted him twice. Each time he was told, unceremoniously, to "Shut up!" Now Sandy could stand it no longer.

"Hey, Bill!" he said. "I think you're right about that being the Saver of Souls. You know he jumped me over Chesapeake Bay. I remember that swerve in to the left just before he tripped his guns. He was coming in on my starboard side, out of line of my guns. Just before we passed he kicked his ship around so that his bullets would slash right across my nose. He underestimated his speed or he would have knocked my head off. Then he zoomed as I stuck my nose down."

"That's right," Bill said.

"But I don't understand what this is all about, Bill. I can't put it together. What—"

"Listen, kid," Bill said. "Don't ask me any questions. I don't know any more about it than you. That's why I'm going to stay on his tail and find out."

"You want to be careful he doesn't lead us into a trap," Sandy advised with all the wisdom of his seventeen years.

"I'll watch that," Bill said, "while

you see if you can pick up Tony Lamport on the radio."

Sandy worked with painstaking care while Bill held the Lancer on the tail of that dun-colored ship. He tried to get Tony on both of their secret wave bands without success. Finally he gave up.

"We're out of range, Bill," he reported.

At the same time Bill became aware of the cloud wall ahead. At first it was almost imperceptible. But as they neared the Irish coast the little amphibian ahead became a mere dot in the damp, swirling fog that engulfed it.

Bill tried desperately to stay on its tail, hoping the front would break before he lost it entirely. He plunged the Lancer into it, holding the same airspeed and course, flying entirely blind. When he came out on the other side the dun-colored ship had disappeared.

He cursed softly as he reached for the master tuning control on his radio panel and picked up the radio operator at Foynes, near the mouth of the Shannon. He got the direction and force of the wind and learned that he would have unlimited ceiling.

Forty-three minutes later he took the Lancer into the Irish air terminal for a workmanlike landing.

The manager of the terminal and the superintendent of operations met him on the apron. Behind them were a score of "tin knockers," mechanics, grease monkeys and inspectors. They were there to get their first glimpse of Bill Barnes and his famous Silver Lancer. He killed his power plant to avoid injuring them as they swarmed toward him. He waited until the manager had cleared a way for them, then he and Sandy dropped over the side.

In the manager's office Bill tried to keep the excitement out of his voice as he casually asked about the Memphis.

A worried expression fastened itself on the big Irishman's face. "We're worried about her, Barnes," he said. "I thought perhaps you'd have some word about her. I thought you might have picked her up on your radio out over the Atlantic."

"What's the matter?" Bill asked, quickly, to forestall a possible question he didn't want to answer.

"We don't know," the manager said. "When she was three hours out we suddenly lost contact with her. She reported she was making good progress through a fog area. After that there was silence. We have made contact with steamers in her area but they haven't been able to give us any information. Unless something went wrong with her motors she may be on the way back here. We're going to wait another half-hour before we send

out an alarm. It may be only her wireless that is out of order. We expect to hear from her at any time. But we can't help worrying. You must be worrying about her, too, being a large stockholder in Transatlantic."

"I am," Bill said. "I wonder if it is possible for me to get a telephone call through to the Duke of Malbury at Arunway Castle in Malthrop, England?"

"We can try," the manager said, reaching for the telephone. "I'll start our operator working on it. You want to speak to the Duke of Malbury personally?"

"That's right. Have them try to locate him if he isn't at Arunway."

Bill kept up a constant conversation while he waited for his connection to be made. He avoided answering direct questions about the Memphis a half-dozen times. He didn't want to tell this man about the things he had seen because he didn't know how the other would handle the situation. Bill realized he must get to the foundation of the thing and find the men who were responsible for the destruction of the Memphis if he was to save Transatlantic Transport. He knew it would be the death of the line if he could not tell the story and then prove it. He remembered quite distinctly how a ban had been put on the ships of a certain company after several unexplained mishaps. The company had disappeared into oblivion. And there was nothing he could do for the Memphis, her passengers or crew. They were beyond help.

He started nervously as a telephone bell clanged.

"Here's your party, Barnes," the manager said. "They located him in London."

Bill's hands were shaking as he took the instrument. "Hello, Mace," he said into the mouthpiece to Norman Edward Chatagnier Elliott Mace, the seventh Duke of Malbury, whom he had saved from death while he was excavating in the Valley of the Tombs of the Kings in Egypt.

"Are you there, Barnes?" Norman Mace answered with his precise British accent. "This is delightful."

"No, it isn't," Bill said, hoping Mace would get the idea. "I'm at Foynes on the Irish coast, as you know. I'm going to hop to Croydon within a few minutes. Can you meet me there?"

"I say, Barnes, what's up?" the Duke of Malbury asked.

"I'll tell you when I see you at Croydon in—about an hour and a half. Right?" Bill said.

"Right," Mace repeated. "I'll be there, Barnes. And I repeat it will be delightful. Cheerio."

Bill put the instrument in its cradle and immediately began a great fuss and

bustle about getting away. He didn't want to be asked any more questions.

As he took the Lancer into the air, a man who was a visitor to the air terminal approached the manager on the apron. He was a small man with an olive skin and dark eyes. He might have been a native of any one of several countries of southern Europe.

"Wasn't that that American chap, Barnes?" he asked the manager in excellent English.

"That's right," the manager said, admiration shining in his eyes. "Bill Barnes."

"That is a great ship he has there. What is he doing over here?" the small man asked.

"I don't know," the manager answered. "He's on his way to Croydon." He looked down at the little man as Bill's ship became a mere speck in the air to the east. "Why?" he added.

The small man shrugged his shoulders with a true Latin gesture and moved away without answering.

VII—SPY SYSTEM

LONDON was a great mass of blurred lights through the fog hanging over it as Bill cut south to pick up the steady beacons of Croydon. He circled the great airport twice as he received landing instructions from the radio control tower, then took the big ship in with a precision landing that was characteristic of him.

He climbed out and saw the lean, tanned face of the man he had first known in Jogam as Colonel Mace, and later in Egypt as the Duke of Malbury, coming toward him. He noticed that his hair was a trifle whiter and his military mustache more closely clipped than the last time he had seen him. And then they were shaking hands. They were genuinely glad to see one another. When Malbury had finished with Bill he turned his attentions to the grinning Sandy.

"Are you still reading those books that teach you how to be the master of your fate?" the Duke of Malbury asked Sandy.

"No," Bill said. "He has a new one now. At the moment he's collecting autographs. You'll hear about it."

"Thanks for breaking it, Bill," Sandy said, whipping the little leather-bound book out of an overall pocket. He turned over the pages and stuck a pencil in the Duke's hand. "Just sign it there."

The Duke of Malbury wrote his name and chuckled. "You still work fast, eh?"

"Can you arrange things so that they'll put the Lancer under lock and key for me here?" Bill asked him.

"Easily," the duke said. "I have a motor here. We'll roll down to London. I'm anxious to hear your story. Knowing you, I know it won't be prosaic."

A short time later the three of them were settled in Malbury's chauffeur-driven Sunbeam landaulet.

"You'd better plug up that speaking tube so your chauffeur won't hear us," Bill said when Malbury asked him a question.

"Righto." Malbury stuck a handkerchief into the mouthpiece.

Then Bill unfolded the things that had occurred to him during the past twenty-four hours, interspersing them with an account of the man he called the Saver of Souls.

They were deep into the heart of the great city of London before Bill had finished. Malbury had only interrupted a half-dozen times to ask questions.

Now, his breath exhaled through his lips in a long, low whistle. His eyes were half-closed as he shook his head slowly from side to side.

"A tale I would not believe if it hadn't come from you, Barnes," he said. "A most incredible thing."

"It is," Bill said. "I wouldn't believe it if it hadn't happened to me. The thing is, where shall we start to find this man? He must be somewhere in the British Isles. You know the ropes. You know who to go to to start such a search. The man must have a vast amount of money. You wouldn't hunt for him in the places you would look for the average dangerous character. Every possible landing place in Ireland and England must be checked to get trace of those dun-colored biplanes."

"We'll have to know everything before we release the facts," Malbury said. "I have a friend, a pal, Lord Hereburn—he's the man to go to. We must start the ball rolling from the top. He is high up. All the machinery of the home office will begin to click if he gives the word. An ant couldn't get out of England then if they didn't want it to."

"Where can we find him?" Bill asked.

"Easy does it, my boy," Malbury said. "I'll have to locate him and talk to him alone first. He isn't the kind you can walk in on. You said you were going to the Hotel Cecil? You're sure you wouldn't like me to put you up at one of my clubs?"

"No," Bill said. "I prefer to go to the Cecil until this thing is over. Then, I would like to spend a few days with you at Arunway. This," he added bitterly, "is supposed to be a holiday for me."

"Yes," Malbury said. "We'll rest up out at the old pile of rocks when we get this thing straightened out. I'll drop you at the Cecil and start my hunt for Hereburn. I may reach him immediately, or it may be morning before I find him. You look as though you needed rest. You'd better get it now because there is nothing you can do. We'll have the jolly old ball rolling when you wake up."

Malbury's chauffeur helped them into the lobby of the Cecil with the luggage they had brought with them.

"I'll ring you sometime tonight or the first thing in the morning," Malbury said as he turned away.

"Right," Bill said. "I'll be anxious to hear from you."

His eyes were two bright coals and his face was lined and haggard. Reaction had set in and he was tired as he could never remember being before.

They were assigned two rooms with a bath between them in a quiet spot on the third floor of the enormous hostelry. Bill picked up the telephone in his room and asked for a waiter with a menu.

"I suppose we've got to eat something," he said to Sandy.

"Eat something?" Sandy said. "Say, if I don't get some food pretty quick something serious is going to happen. I'm famished. I haven't had anything to eat since we left Barnes Field."



Wetherby Duncan.

"Who ate all those chicken sandwiches you brought along—your automatic pilot?" Bill asked in disgust.

"I ate them," Sandy said. "But there were only twelve of them."

Bill ordered a light meal for himself and then turned the menu over to Sandy. He got a bath while Sandy was ordering because even the mention of food made him a little sick.

When the food was brought Bill couldn't help noticing the way the waiter's eyes roved over the room and their possessions. When the man brushed against him and let his hand flick across the two patch pockets in his dressing gown, he knew he was trying to find out if they were armed.

"The Saver of Souls knows how to handle his cutthroat business," he said to himself. "He is probably going crazy because I stuck my nose in his little scheme."

After they had finished eating Bill said to Sandy, "You hop in there and turn your light out and get some sleep,

kid." He followed Sandy into his room and saw that the fire escape that was outside his own room did not reach to Sandy's. There was a sheer drop of thirty feet to the roof of the next building.

"Good night, kid," Bill said. "I'll let you know as soon as I hear from Malbury."

"Okay, Bill," Sandy said. "Gosh, I'm sleepy."

VIII—THE QUIVERING KNIFE

WHEN Bill went back into his own room his nerves were jangling. He was tired to the point of exhaustion, yet he didn't want to risk falling asleep. He was almost certain that an attempt would be made to kill him before morning, and he realized he couldn't stay awake to defend himself. He thought of trying to get in touch with Malbury again and have him secretly get a couple of men from Scotland Yard to guard him while he slept. He discarded the idea as not being feasible. He finally decided that his nerves were jumpy and his imagination was running away with him.

But he didn't sleep in the soft, three-quarter bed that was in the room. Instead he rolled up a blanket and put it in the bed where he should have been. At the end of the blanket on the pillow he placed an overall bunched up to give the general outline of his head.

Then he lay down on the couch that was against a wall, determined to stay awake as long as he could. In three minutes his eyes were closed and he was deep in sleep.

The room was shrouded in darkness, except for a thin stream of moonlight cutting across the bottom of the window sill. There wasn't any sound or the faintest rustle to disturb the quiet of the night.

Suddenly Bill was wide awake. Instinct warned him not to move, not even to raise his arm to look at the luminous dial of his wrist watch. The muscles in his body became tense, and he could feel perspiration oozing from his face. He knew that something was in the room. He continued to draw deep, even breaths as though he was still sleeping.

Then a tiny beam of light danced across the bed and was gone. For an instant a lean brown hand had appeared in the beam of light—a hand that clasped a knife. The blade was only four inches above the form in the bed.

Bill waited to hear the knife swish down into the bedclothes and rolled blanket. But no such sound came to his ears. He knew that the person holding the knife had detected his ruse and was silently waiting until he located the spot from which the sound of breathing came.

Cold sweat ran into Bill's eyes as he

conquered an almost overwhelming desire to shout or leap to his feet and snap on a light. He knew that when he moved he must be sure of the location of that figure or the knife would find a resting place in his body.

He saw a faint shadow moving toward the little hallway that led into the bathroom and Sandy's room. Slowly, without moving the rest of his body, he brought his legs up. He knew he must stop that form from getting into Sandy's room. Like a streak of lightning he whirled his body off the couch to the floor.

For sixty long, horrible seconds he stayed as still as death itself while he tried to locate the breathing of the intruder. His nerves were taut and screaming as he wriggled silently toward the wall. He tapped gently on the baseboard, then flattened himself out with his cheek hugging the rug.

Something swished above his head and thudded into the wall, where it vibrated back and forth angrily for a moment. Then the room was absolutely still again. He listened for the faintest sound, the scrape of a button or the exhaling of breath. When he could stand it no longer he began to edge along the floor toward the hallway, a fraction of an inch at a time. He knew the man across the room was waiting for another move, probably worming his way toward him.

A button of Bill's pajamas scraped the floor and he hugged the rug again. After a bit he continued. Reaching the other side of the room he began circling it inch by inch. His eyes began to become adjusted to the dark, and he could pick out various objects. None of them faintly resembled a man.

He pulled himself upright along the wall where he knew the light switch was located, and still there was no movement in the room. He cursed himself for not having stuck an automatic in his pocket before climbing out of the Lancer at Croydon. Switching on the light meant he would be a perfect target if the intruder had a gun. And it was beyond reason to hope that he didn't have a gun.

The cold, grey London dawn came creeping in the window while he stood there trying to make up his mind what to do. He was certain that the door to Sandy's room had not been opened, yet he was half-afraid that it might have been. As the room became lighter and lighter he realized that in some mysterious manner the prowler had vanished. He switched on the light.

The room was empty.

His piercing scrutiny stopped when his eyes fell on the knife sticking in the wall, mute evidence that he had not been dreaming. He took two quick steps and threw the door of Sandy's

room open. Sandy was peacefully sleeping.

Back in his own room he found that the door that led to the corridor was unlocked. He was positive that he had locked it before he lay down on the couch. He found the key on the floor and knew that it had been pushed out of the keyhole from the outside.

He searched the room for some further evidence of the intrusion but found nothing. The only memento was the wicked-looking knife sticking in the wall. He decided to leave it where it was until he had talked with Malbury again and it could be dusted for fingerprints. He knew that the waiter might easily have been the intruder. He wondered how he had managed to get out the door without making a sound.

After locking and bolting the door and window he climbed into the bed. He was comparatively safe for the time being.



Sir James Aird

It was broad daylight when the peal of a telephone bell awakened him. The clerk announced the Duke of Malbury calling.

"Please send him up," Bill said, adding, "And give me room service."

He ordered a pot of coffee and went into the bathroom to splash some water on his face and comb his hair. He was hoping desperately that Malbury had turned up something into which he could set his teeth. He was beginning to blame himself for not having taken more drastic action the night before. If Malbury hadn't uncovered something that would lead him to the Saver of Souls, the man would be able to escape entirely.

And Bill knew that if he told his story without proof at this late date he would be laughed off the face of the earth.

IX—"LEAVE ENGLAND!"

BILL BARNES threw a dressing robe over his pajamas and answered the knock on his door. Outside stood a uniformed bellhop.

"The Duke of Malbury, sir," the boy said and turned away as the dim figure behind him stepped into the room and closed the door behind him.

The man who stood there looked more like a duke than the Duke of Malbury. But he was not the duke. He was a pleasant-faced man with iron-grey hair and a strong face tanned by sun and wind. His pale eyes were twinkling as he watched Bill's astonishment.

"You——" Bill began.

The man entered the room and threw his light-grey fedora and gloves on a chair and opened his light fall coat.

"No," he said, "I'm not the Duke of Malbury. But he told me to use his name. He said you might not admit me unless I did. It's a nice morning, isn't it?"

"Yes," Bill said grimly. "It's a nice morning. And who the hell are you?"

"My name is Aird, Mr. Barnes," the man said, and a pleasant smile played on his lips as he held out his hand. "I'm sorry to have walked in on you this way, impersonating the Duke of Malbury. When I saw your astonishment I decided I'd better get into the room and close the door before you threw me out. I'm with the Air Ministry. I've spent half the night talking with Malbury and Lord Hereburn. When we came to a decision they asked me to come and talk to you."

"But why didn't Malbury come?" Bill asked.

"We decided the whole thing should be handled on a strictly formal basis," Aird said evenly. "Malbury was of the opinion, because of the friendship that exists between you, that he could not present our decision to you fairly. Malbury was entirely on your side, Barnes, against Lord Hereburn and myself. He asked me to convey his best wishes to you and wanted me to tell you that he would write to you and see you at Barnes Field, Long Island, very soon."

"Malbury isn't going to see me again?" Bill gasped.

"No," Aird said. "We are of the opinion, Mr. Barnes, that the sooner you get back to the States and forget this thing the better off things will be for everyone."

"Forget it!" Bill shouted, and he could feel the blood beating against his temples. "Like hell I'll forget it!"

"Perhaps I put that wrong," Aird said. "I meant forget it as far as other people are concerned. We know you can't forget what you saw but you can keep it to yourself and muzzle young Sanders."

"Listen," Bill said desperately. "If I'm not mistaken you are Sir James Aird with D. S. C. and so forth after your name. You're known around the world in aviation circles."

"That's right," Aird said. "I know

this is a frightful blow to you, Barnes. But the thing must be kept quiet."

"You mean," Bill said, "you're going to let those murderers get away with it? Let them destroy a ship worth nearly a million dollars and wipe out thirty or forty people? Why, it's a criminal action on your part. You'll become an accessory after the fact. You'll be as guilty as they are."

"Take it easy, Barnes," Aird said persuasively. "Calm down. There are times when even nations must condone such things. Here is the situation: We are of the opinion that this man you call the Saver of Souls had nothing to do with the destruction of the Memphis. We——"

"Nuts!" Bill exploded, "to use a vulgar expression. I have engaged that man three times in the air and I know his tactics. You are treating me as though I was a child. Don't you suppose I know——"

"That particular trick by which you identified the man to Malbury is an old one, Barnes," Aird interrupted. "I first used it twenty-two years ago when I was a lieutenant in the Royal Flying Corps. I learned it from a famous German ace. So, you see, you have nothing to establish your identity of the man. Besides, you don't know who he is."

"That's what we've got to find out," Bill said. "That man has been in my hair long enough. I'll find him myself if you won't help me."

"No," Aird said firmly, "you won't. And I'll tell you why. England and the United States are not the only nations that are flying the Atlantic with passengers and mail and cargo. Remember that France, Germany and Italy are doing the same thing. England and the United States have the jump on them with larger and better planes. We have also made more thorough surveys. Doesn't it occur to you that, possibly, one of several companies in each of those countries might be anxious to prevent Transatlantic from becoming the premier carrier across the Atlantic? Suppose we go nosing into this thing and find that, with the situation as delicate as it is today in Europe, one of them is guilty? What will it mean if it is released to the public? Only one thing. War!"

Bill Barnes stood in the center of the room, his legs widespread as though to absorb the shock of a physical blow. His face was a mask of hopeless fury. He could understand the wisdom in Aird's presentation of the problem, but he refused to accept it. He told himself that he would find the men guilty of the crime or die himself in the attempt. Then he told Aird.

"That is all right," he said as calmly as he could. "I understand your point of view. But what about Transatlantic

Transport? It means the death of the company. They will never be able to survive the unexplained loss of their first passenger-carrying plane. Even though I didn't have a large interest in the company I could not stand by and see them ruined by such tactics."

"They can reorganize under another name and the public won't know the difference," Aird said. "Their loss is probably covered by insurance."

"That isn't the point!" Bill roared. "You fellows can take it lying down. But I won't! They sent a man here to this room last night to murder me because I know what I know. Do you think I'm going to keep on running away from this man who calls himself the Saver of Souls? He wrote me a note one time telling me there was not room in the world for both of us. I laughed at it. But now I know he was right. There isn't room for a murdering rat, who kills defenseless people with the connivance of the British Air Ministry, and me!"

"Those are pretty strong words, Barnes," Aird said softly. "And I wouldn't advise you to go about repeating them. We're not interested in your personal feud with the Saver of Souls. We're only interested in the safety of England and we can't afford to become embroiled with an enemy over this thing. We will, of course, put our secret agents to work and when we reach a conclusion we will take suitable steps."

"You can't tie my hands!" Bill said. "I'll go ahead until I find him. And I'll tell the world what happened!"

"Not while you're in England," Aird said. "Which will not be long. Hereburn, Malbury and I decided that you must get out of the country. We have enough troubles now without having you around with a tinder to start more. I have been asked to respectfully request you to leave the country at once."

For once in his life Bill Barnes was speechless. He could scarcely believe what he had heard. A thousand thoughts flashed through his mind as he stood there staring at Aird. A thousand thoughts that had to do with the existing friendship between England and the United States and his small part in it.

It is impossible to tell what he might have said at that moment if Sandy Sanders had not opened the door of his bedroom and stuck his tousled head out into the little hallway.

"Hey," he said, "what's all the shoutin' for? Can't you let a young fella get a little sleep?"

He hitched up the bottoms of his pajamas with one hand while he rubbed his eyes with the other. Then he strolled into Bill's room in his bare feet.

Some of the rage left Bill's face at the sound of his voice, and the man

who called himself Sir James Aird laughed outright.

"This," he said to Bill, "would be that young demon of the air, Sandy Sanders."

"That's right," Bill said grudgingly. "Sandy, this is Sir James Aird of the British Air Ministry."

"Is that so?" Sandy said as he shook hands with Aird. "I've heard a great deal about you, of course. It's quite an honor to——" Suddenly, he stopped talking and grabbed at his pajamas with his free hand. His face lighted. "Say!" he said. "What about your autograph?"

"He collects 'em," Bill explained while Sandy darted into his room and returned with the little leather-covered autograph book.

"Right there, please," Sandy said, opening the book and handing Aird a pen.

Aird wrote his name and handed the book back to Sandy.

Sandy shook his head. "You didn't finish it," he said. "Put those V. C.s and D. S. C.s and things like that on, too."

"Righto," Aird laughed.

"Get some clothes on, kid," Bill snapped at him.

"Righto!" Sandy said, echoing Aird. He went back into his room. Bill waited until he had closed his door.

"All right," he said to Aird, and there was utter hopelessness and defeat in his voice. "I'll get out of England. I'll get out and I'll never come back. But you can't muzzle me when I get back to the States. I'll talk and I'll have young Sanders to verify what I say."

"That," Aird said smoothly, "is entirely at your own discretion. We can't stop you from talking then. But I think, when you have had time to cool off a bit and give the matter a little thought, you'll decide to keep quiet. You'll do it to prevent people from calling you a liar."

Bill didn't answer him. He knew he was licked and he was afraid to speak because of what he might say. He stood in stony silence while Aird bade him good-by and closed the door behind him.

Then he gave vent to his feelings. He was still cursing when the door to Sandy's room flew open and Sandy came tearing in.

"Bill!" he screamed. "Where is he?" Sandy was waving his autograph book.

"He's gone, damn him," Bill said vehemently.

"Listen, Bill!" Sandy said, barely able to talk because of his excitement. "That guy wasn't Sir James Aird. He's the rat who calls himself the Saver of Souls!"

Bill gazed at him for a moment as though he thought he was crazy. Then he got hold of himself because some-

thing in Sandy's expression impressed him that he knew what he was talking about.

"Quick, kid," he said. "How do you figure it?"

"Remember I was studying handwriting and ventriloquism on our last trip to South America when you first tangled with him? He wrote you a note at that time and I studied it quite thoroughly and remembered it. When I saw Aird's signature I was sure I had seen that writing before. Finally, it came to me. And remember his voice the day he broke in on the radiophone? They talked like the same man!"

For a split fraction of a second Bill stared at him. Then he leaped for the telephone. He got the bell captain on the phone and asked him to find out from the starter in front of the hotel where the man who had just left his room had gone.

Then he started on a telephone quest for Lord Hereburn. Here Bill's name worked magic. The telephone operator had located and had Lord Hereburn on the wire within a few minutes.

"I'm sorry to be short, sir," Bill said to him. "But I've got to hurry. Did the Duke of Malbury find you last night and talk to you?"

"Ah—ah—no," Lord Hereburn said. "I haven't heard from him in—"

"Right!" Bill snapped. "You didn't see him! Listen carefully. The Duke of Malbury dropped me at the Cecil Hotel last night at ten o'clock. He was going to try to locate you. He was being driven by a chauffeur in a Sunbeam landaulet. You'd better start tracing what happened to him after that. He was to get in touch with me as soon as he had talked to you. I believe he has met with some kind of foul play. I can't explain further but I'll get in touch with you as soon as I can."

He hung up abruptly, snapped at Sandy: "Get into your clothes, fast, kid!"

Again the phone rang, and Bill snatched it.

"The starter says he directed a cab driver to take him to Croydon Airport outside London," the bell captain reported.

"Thanks," Bill said. "Have a fast

car ready for me when I come down in a few minutes. Did the starter know who the man was?"

"We know him as Mr. Mordecai Murphy, an American, sir," the captain said.

"Thanks again!" Bill shouted, slamming down the receiver.

His mind was a seething mass of emotions as he made a connection with Croydon and gave instructions to warm up the Lancer. He could hardly believe what the bell captain had told him.

Mordecai Murphy! The Saver of Souls! They were one and the same! The mystery man who was reputed to be a munitions king, an international banker, a fomenter of human misery and suffering.

"Hurry like hell, kid!" he shouted at Sandy. "We have a real job on our hands!"

X—FINAL TRICK

"DO YOU believe the Saver of Souls is Mordecai Murphy?" Sandy asked Bill as their cab raced toward the great airport south of the city.

"I do," Bill said. "The part fits him perfectly. No one has ever been able to explain Murphy. He is known to have his finger in things all over the world. He has been accused of a thousand crimes in the press. But no one has ever been able to prove anything against him. He is a cunning, shrewd manipulator."

They saw the twin, three-bladed props of the Lancer idling on the apron as they stepped out of the cab. At the same instant they saw Mordecai Murphy, alias the Saver of Souls, alias Sir James Aird, climb into a low-wing monoplane; he blasted the tail around and jockeyed down across the field.

In that instant it came to Bill how close he had come to letting Murphy bluff him out. He knew that in another few hours he would have been at Croydon for an entirely different reason than he was there now. He would have been making preparations to fly the Lancer back to America. And he knew that he would have left his self-respect behind him in England.

He raced across the apron with Sandy at his heels and dove into the

forward cockpit of the idling Lancer. The low-wing monoplane with Mordecai Murphy at the controls was streaking away to the south as Bill hung the Lancer on its props in pursuit.

"Get your swivel gun out, kid," Bill said into his telephone. "I'm going to get him this time. He's going back and he's going to talk. I should have had enough sense to know the British Air Ministry would never send Sir James Aird to me with any such orders."

"You going to shoot him down, Bill?" Sandy asked.

"No," Bill said. "I'm going to force him down. I don't know where he's heading. I want to stop him before he gets over the Channel."

"Do you think his ship mounts any guns?" Sandy asked.

"No," Bill said. "I don't think so. But be ready. That bird may pull anything out of his hat. I'm going above him and trim off his nose to force him lower."

The great chalk cliffs of Beachy Head were under their wings as Bill got the nose of the low-wing monoplane under his telescopic sights. The next instant his finger clamped down on his 37mm. cannon. He fired a burst of five shells that were all tracers just above the nose of the speeding plane.

He saw Mordecai Murphy's upturned face as those five shells danced above his head. Then he banked the Lancer around on its right wing-tip as the monoplane flipped its tail into the air in a diving turn that brought it closer to the choppy waves of the Channel three thousand feet below.

Again Bill stuck the nose of the Lancer down to fire a burst as they raced westward along the coast. This time the face of the Saver of Souls was white and strained as he gazed up and back at the man who rode his tail so relentlessly.

Bill knew that now he had his enemy where he wanted him. The other was unarmed and flying a plane that was in no way a match for the Lancer. For the first time Bill was engaged with him with the odds on his side. He resolved that if he could not force him to land he would shoot away his controls and force him to bail out.

Then the crumbling promontory of Culver Cliff on the Isle of Wight flashed under their wings and they were above the rolling hills and tranquil villages of the "bowl" at the southern end of the island.

Bill opened the throttles of the Lancer and raced ahead of the low-wing monoplane. Then brought the nose up and around in a climbing turn to race back at it with his Brownings yammering. He was trying, desperately, to force it back above the rolling countryside where it could make a landing. He lifted the nose of the Lancer to keep



At precisely the measured time for the hull to leave the water the enormous high-wing monoplane took to the air—

his bullets from driving into the cockpit of the little monoplane.

He was only fifty yards away from the little ship when he saw Murphy lift the nose and heard the staccato clatter of a machine gun that was not his own. At the same instant he felt bullets drumming into the metal surface of the Lancer and felt it buck from the impact. He yanked the stick back into his stomach and heard Sandy's scream of warning as Murphy's bullets drove up through the belly.

As Bill leveled off he looked back and down and saw the machine-gun trough along the engine housing of the monoplane, and he cursed at himself for not having noticed it before. It was only a single .30-caliber gun, but in the hands of Murphy it was equal to a half-dozen weapons. He poured soup into his power plant and brought the Lancer up and over on its back and rolled it level.

Murphy had dropped the nose of his little ship and was racing away to the northwest.

Bill's face was a grim mask of determination as he eased the stick of the Lancer forward and gunned his engines. Ahead the precipitous cliffs of Freshwater Bay climbed out of the Channel into the gorse and heather of the downs. Everywhere the cliffs were cleft by jagged ravines and glens, cut under by the sea and hollowed out into water-side caverns. Bill knew that no one could survive a forced landing at the base of those cliffs where deadly under-tows raged.

Back and forth from Blackgang Chine to The Needles along one of the most rugged and lofty coasts of England raced the two ships. A half-dozen times Bill could have blown the low-wing monoplane out of the air with his explosive shells, but he wanted to take Mordecai Murphy alive. He was entirely convinced now that Sandy was right. That the man was Mordecai Murphy and also the Saver of Souls.

Suddenly, the black monoplane was zooming up underneath him with its single machine gun spewing burst after burst. Lead chewed through the leading edge of his port before he could slam the Lancer out of range.

The monoplane roared upward until it almost stalled, then flipped over and came down on Bill's tail as he started a sweeping turn to the left.

Bill heard the chatter of Sandy's .30-caliber machine gun as he half-rolled out of that deadly hail of lead. The next moment they had leveled off again and were roaring at one another with terrific speed. Bill's fingers clamped down on his gun trips only to have Murphy slip the monoplane away. He came up and around in a lightninglike chandelle and dived on the speeding black ship. But when he clamped down on his trips the monoplane crabbed out

from under his sights as though some unseen hand had flicked it out of danger.

Bill shook his head in disgust as he realized that he had underestimated the skill of Mordecai Murphy again. Because he knew the Lancer was superior to Murphy's ship he was not bearing down hard enough. He was letting Murphy slip away from him, knowing in the back of his mind that he could shoot him down at any time if he wanted to. But he was trying to puncture his tanks instead of wounding him. He wanted him alive to tell his story.

Then they were roaring at one another again with their guns vomiting fire and death. And this time Mordecai Murphy swerved his little black monoplane in to the left for a death-dealing burst of fire just before they passed. Bill kicked the Lancer off to his right to avoid the monoplane as it zoomed upward.

They came up and back, each in a flashing chandelle, and now Murphy seemed determined to stay in the fight instead of running away. He was handling his ship with uncanny skill as they roared at each other again at terrific speed.

Again Murphy pounced in to his left just before the two ships passed. But this time his gun was silent and he did not zoom upward to avoid a crash. Instead he held it hard on until it was too late for Bill to realize his mad intent. The tips of the props of the two ships bit into each other with a blood-curdling impact as metal met metal. The crash was like a mighty clap of thunder. For one terrible moment they hung together, seemingly leashed, dangling in midair.

Then they fell away and began a twisting, tortuous descent toward the delicately colored cliffs of Alum Bay, just beyond the gaunt, projecting rocks reaching up to embrace them that were The Needles.

Bill Barnes struggled with all the power of his will to get his eyes open. The dim room rolled around him in a dizzy circle that left him sick.

"Take it easy, Bill," he heard a vaguely familiar voice say, a voice tense with anxiety.

"He'll be all right in a bit," another voice said, and he was conscious of something cool being rubbed over his face.

"Easy, easily, old chap," another voice said, and he could feel a restraining hand on his arm as he tried to struggle upward.

Finally, he collapsed backward and closed his eyes again. After a time he opened them. Things no longer danced before him. He gazed at the anxious blue eyes and freckled face of young Sandy Sanders until he recognized it.

"Hello, kid," he said. "What the hell happened?"

"Do you remember anything, Barnes?" another voice said, and when Bill studied its owner's face for a moment he recognized the Duke of Malbury.

"A little," he said weakly. "How long have I been out?"

"Three days, Bill!" Sandy said. "And was I worried!"

"What happened?" Bill asked again.

"We were tangled up with Mordecai Murphy, the Saver of Souls," Sandy said. "He rammed us."

"Am I all right?" Bill asked.

"Just a bad concussion and bruises and a broken arm," Sandy said. "You've been conscious but delirious."

"Listen!" Bill said. "Did Murphy talk? Did he tell the truth about the Memphis?"

"He couldn't talk, Bill," Malbury said. "He's dead. But we got Duncan. We found him aboard Murphy's yacht at Cowes. That's where Murphy was headed when you followed him. We found Duncan and we thought there must be some connection because he was the head of International Airways. He finally talked. The whole story has been released just as you told it to me. All of England has been praying for your recovery."

A man who looked like a doctor said, "You'd better not tax his strength too much at first, sir."

"Wait a minute," Bill said. "What happened to you, Malbury? Evidently Lord Hereburn found you."

"Yes," Malbury said grimly. "They found me. I was being detained, to put it mildly. But you'd better rest now, Bill. A surgeon had to perform an operation to relieve the pressure on your brain. You'll be all right in time but you'll need a long rest."

"Yeah," Bill said, and he managed a thin grin. "A holiday! That's what I came over here for. What about you, kid? Didn't you get banged up at all?"

"Just a few bruises and a couple of cuts on my head when I rammed it into my crash pad," Sandy said.

"He did a really masterly job," Malbury said. "He brought the Lancer out of a spin without any power and set her down right side up."

"What about the Lancer?" Bill asked.

"She'll need a lot of patching up," Sandy said doubtfully. "I learned of an amphibian airplane factory on the Isle of Wight. I had her hauled over there."

"Good work," Bill said. "How soon do I get out of this place?"

"In a few days," Malbury said. "You were lucky you didn't have a fracture. When you get out you're coming up to Arunway Castle for a good long rest."

"Yeah," Bill said again. "For a holiday!"

MODEL MAKING—

Air Trails Department of Practical Construction

Guest Editorial

By Irwin S. Polk

(Manager of the National Contest, pioneer in power-model plane promotion, Director of the Metropolitan Model League.)

COME TO THE NATIONALS!

Once a model builder attends a National Meet you can bet all the balsa in South America he won't miss any of the others!

The National Championship Model Airplane Meet—the climax to a year of model designing and building—is the irresistible magnet which draws hundreds upon hundreds of model builders from every nook and cranny of the United States.

Whether it is the keen sportsman-like spirit of competition, the joy of meeting fellow aeromodelers from afar, the thrill of travel to and from the meet, the hunger and curiosity for more knowledge, the fun and entertainment that usually go with each contest, the possibility of winning a coveted National trophy steeped in model tradition, the reward of recognition for outstanding model performance, the escape from home, job or school, or the combination of all that makes the Nationals the biggest model event of the year, is a matter for debate.

For both beginner and expert the National Meet holds promise and thrills galore. Here the amateur and the champ compete on equal terms and many is the time a 13-year-old youngster from the sticks has walked off with important awards after competing with old dyed-in-dope balsa butchers.

You stand as much chance as the next fellow—so pack up your models, gas up the buggy and hit the road to Detroit! If you can't make it alone pool your funds with a number of others and share the costs. Or get your Exchange, civic or N.A.A. club to sponsor the winners of a local elimination meet. Your newspaper or department store might like to help, too—try them all! Remember the date—July 6th to 9th.

The Nationals provide an experience you won't forget in a lifetime. **ON TO DETROIT!**

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The RISER RIDER

Presenting another champion, trophy winner at the Mississippi Valley Contest—a ship of ultra modern design that traveled 100 miles on its winning flight—the 22nd Air Trails Trophy Winner.

By Roy Marquardt

In collaboration with Gordon S. Light

THE day of the outdoor events of the Mississippi Valley Contest dawned clear and hot. Our own Burlington, Iowa, group had camped at the Parks Airport in East St. Louis in order to be first on the scene. But we weren't. It was hardly dawn before we heard winders turning and motors popping. After telling the world what we thought of people who disturbed such wonderful dreams of trophies and cross-country flights, we proceeded to add to the din in a more orthodox manner.

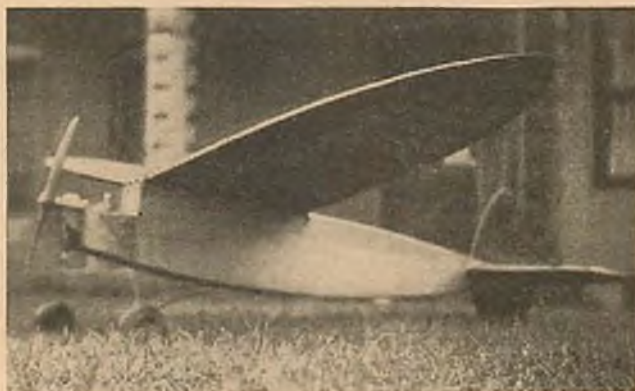
An unusually large number of contestants kept the meet from getting under way until 11 a. m. Soon after, Riser Rider was ready for a flight with $3\frac{1}{2}$ sixteenths of an ounce of gas in the tank. A few seconds later she was high in the air. The motor cut at about 3 minutes, the nose seemed hardly to dip—it was already on a riser.

Roads from the airport toward the Mississippi seemed to have a terrifying ability to end abruptly, but finally one went through, and 23 minutes after launching, we stood on the Mississippi levee and watched the model disappear over downtown St. Louis.

Fortunately the model carried my name and address and two days later it was reported found 30 miles away, 9 miles on the other side of the city limits of St. Louis. Judging by wind velocity, the model was in the air at least 4 hours after we lost it and must have traveled 100 miles in a straight line—all on less than $\frac{1}{4}$ ounce of gas—representing a fuel consumption of 51,000 miles per gallon.

Although very easy to build, the model incorporates several new features. The wing and tail are double elliptical, combining beauty and the most efficient outline known. A new method of construction makes it unnecessary to plot all the ribs individually. Fuselage is

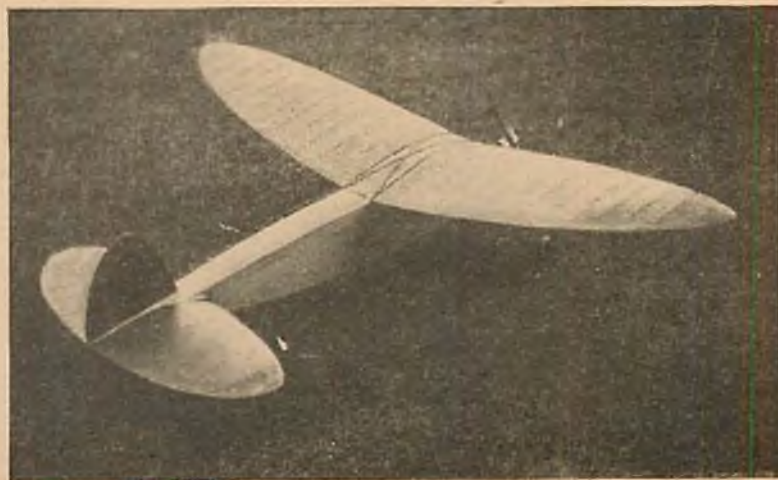
extra sturdy. An elliptical cross-section would have less drag, but ease of construction and the addition of lift and stability from the duck-shaped tail more than counteract this. Low speed, high thrust line, fuselage shape and the split rudder tend to produce a much more stable combination than the usual contest model.



The Riser Rider features the latest technique in the adaptation of all elliptical surfaces, the co-ordination of stable wing and stabilizer sections, and a simple planked fuselage. It has also been made unnecessary to plot each rib individually.

WING

Plot a 16" Eiffel 431 from the co-ordinates on Plate 3. The ribs themselves are $\frac{1}{16}$ " smaller than this all around. Transfer to thin metal and cut out. Ribs are cut like ribs for indoor models—from a $\frac{1}{16} \times 16 \times 12$ " sheet made by gluing 2" widths together. Place template on wood and cut around the top edge only. Move template down $\frac{1}{4}$ " and repeat until the required number of strips have been cut. Then turn the template over and repeat, using the bottom edge as the cutting edge. Cut from the rear to the proper length. Cut front and rear



of the strips so that top and bottom join perfectly. Rear should be $\frac{1}{8}$ " high as it hits the trailing edge. Glue up ribs and make a $\frac{1}{16}$ " notch in the nose for the leading edge, $\frac{7}{16}$ " deep.

Draw a full-size pattern for the wing half. Draw a center line and plot the leading edge as shown by the outside dimensions. Then plot in spars and trailing edge. The spar patterns should be on a separate sheet. The spar heights given are sufficient to plot accurately, but if more accuracy is desired, the metal rib template may be placed over a line parallel to the rib line on the plans at the point desired so that the nose of template is centered on the line. Move the rear of the template so that top edge hits the line just at the trailing edge of the wing. Draw around it. Move the rib template up so that the bottom meets the line at the same point and draw around. This is full-wing size and spars should be $\frac{1}{16}$ " smaller than this at top and bottom. Cut spars from $\frac{1}{8}$ " hard balsa sheet. Cut $\frac{1}{16} \times \frac{1}{4}$ " notches for the ribs.

The trailing edge is formed from $\frac{1}{4} \times 1$ " strips. Place strip over the pattern parallel to the center line, and starting at the middle cut around the outside. Glue the piece just cut off on the inside at the same distance out. Repeat until the grain cuts across too sharply, then turn the strip until it is tangent to the curve and cut a new angle. (Notice grain lines on Plate 2). Carry this size wood around the tips. The leading edge is made in the same manner from $\frac{1}{8} \times \frac{1}{2}$ " strips.

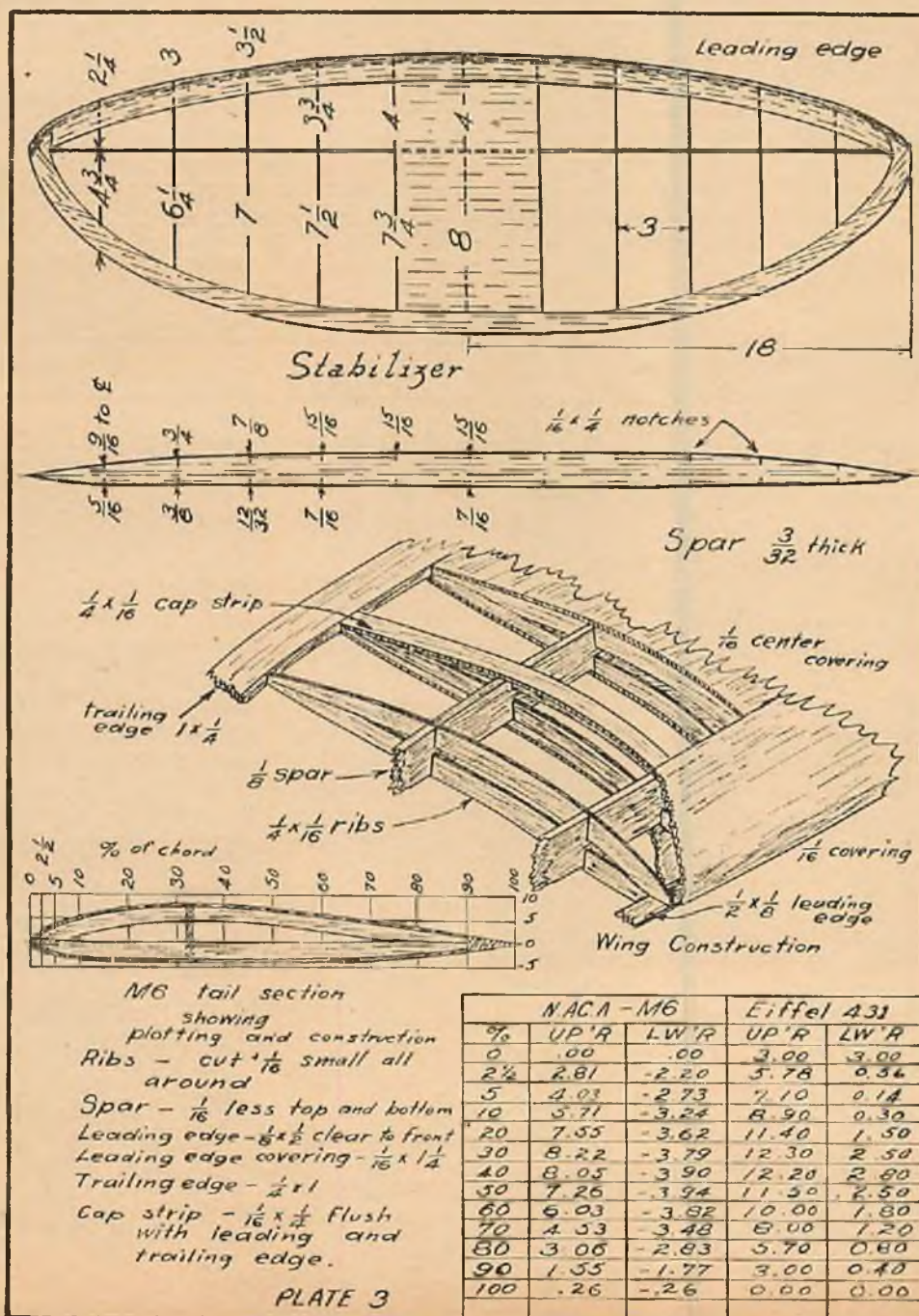
Assemble entire wing and glue. Cover leading edge back to front spar with $\frac{1}{16}$ " sheet. If difficulty is experienced in bending at the extreme nose, $\frac{1}{8} \times \frac{1}{16}$ " strips may be planked in around sharp bends. Put on $\frac{1}{4} \times \frac{1}{16}$ " cap strips flush with top of trailing edge and leading edge covering. Cover center section and tips with $\frac{1}{10}$ " sheets. Tips should have a streamlined section. Sand carefully and give all joints an extra coat or two of thin glue. The original wing was covered with silk, but other material may be used. Apply two coats of clear and one coat of orange airplane dope thinned with 50% thinner. If silk is used, be careful to fill all pores in the silk. If the first coat does not do this, a little flour or wood filler may be mixed with the dope. It is best to sand with very fine sandpaper between coats. When finished the wing should be perfectly flat except for the extreme tips, which are more efficient with a slight negative angle.

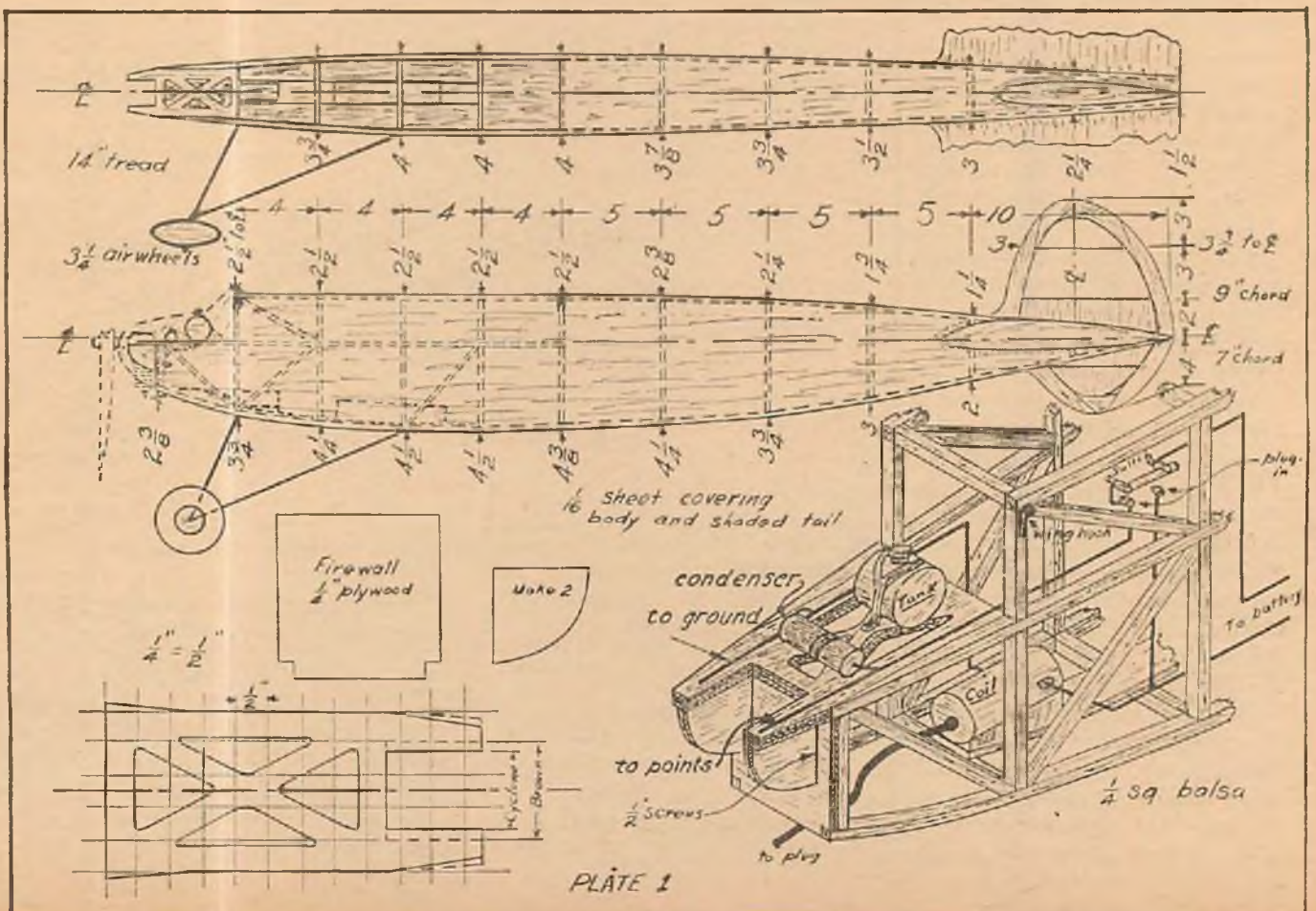
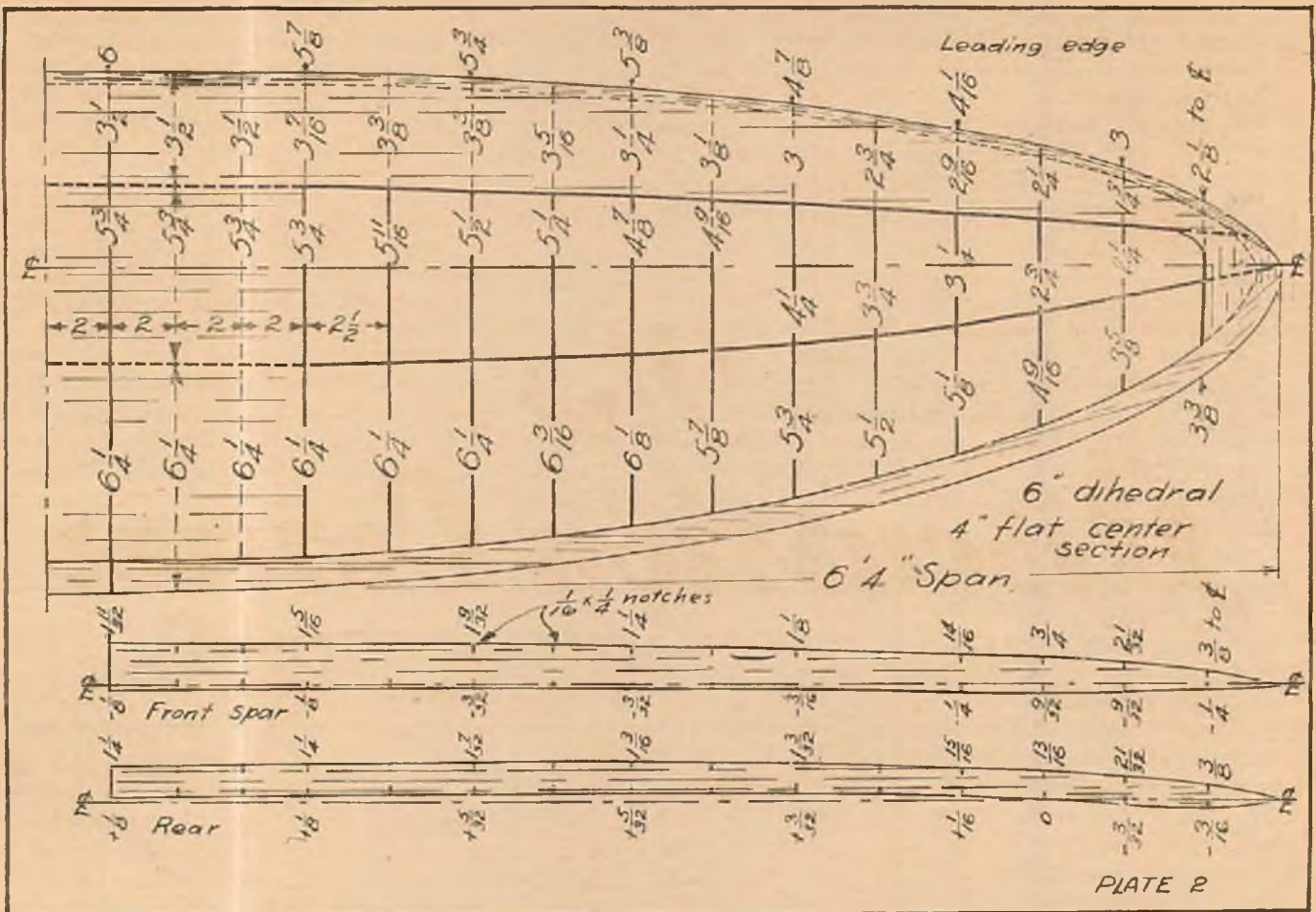
ELEVATOR

The elevator is essentially the same as the wing. A 12" M16 airfoil is used with one spar. Cover the leading edge with $\frac{1}{16}$ " sheet, only $\frac{1}{4}$ " back. Put on center covering and cap strips as on the wing. Cover with silk. Apply only one coat of clear dope before using colored dope.

FUSELAGE

Draw full-size fuselage plans. Assemble two sides from $\frac{1}{4}$ " square hard balsa. Notch thrust-line longerons and front upright halfway so that they join flush. Assemble the fire wall, motor skid and brackets. The motor skid must be cut to different sizes for different motors. The model was flown at St. Louis with a Cyclone, but more recently a Brown was installed for 30-second motor run tests. Either motor—or for that matter any motor in this size range—will give excellent results. The larger motor has slightly the edge for limited (Turn to page 88)





The model art progresses through the exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. Think about them, then write your opinion in 150 words or less and send it to the Discussion Corner. One dollar is paid for each answer printed.

This month's topic: Do you feel that the newly developed "streamline" airfoils offer advantages in model design over the accepted undercambered sections? With what airfoil sections have you obtained the best results?

Next month's topic: Dihedral.

For August—Does the profile or projected area of a model directly affect the stability characteristics of the design? If so, should the plan be laid out with requirements of profile proportions in mind? Answers must reach us by May 15th.

For September: What do you consider to be the best location for the thrust line relative to the profile view of the model? Can general flight characteristics be improved by locating the thrust line definite distances from the centers of gravity and resistance? Answers must reach us by June 15th.

The Discussion Corner

PRO

The new streamline airfoils could be well adapted to models built under the new weight rules because: (1) higher lift drag ratio; (2) reduced center of pressure travel; (3) greater thickness allows more rigid construction without danger of trailing edge warping as with highly undercambered sections; (4) ease of covering with the covering pulling tight rather than tending to separate from the undersurface of the ribs.—GENE HAWKINS, 218½ 24th Ave., No., Seattle, Wash.

Streamline airfoils are fine for heavy fast models such as 10-to-12-ounce-per-square-foot gas jobs, and for some flying scale and racing rubber models. Since this type of model is not a floater they do not build up flying time by gliding slowly from low altitudes but by gaining ample altitude in a hurry. An undercambered section would cut the climbing speed considerably.—PETE BOWERS, Box 357, Los Altos, Cal.

The new streamlined airfoils offer distinct advantages in modeling just as they do in large plane construction. They may be faired into the fuselage more easily and offer less drag than undercambered airfoils. Streamline airfoils prove advantageous on outdoor flying scale models—the undercambered sections are far too sensitive for use on any but indoor scale models.—ROBERT PEIFER, 4451 N. Hamilton Ave., Chicago, Ill.

A cleaner design is obtained by using a streamline airfoil. Beginners experience little trouble making this type of rib. More and more streamline models have been making their appearance at contests. And I think streamlining should be carried out in airfoil selection as well. Experience has proved this to be worthwhile.—FRANK KENEFICK, 102 Mechanics St., Canton, Mass.

The newly developed streamline airfoils offer great advantages by reducing induced drag, which makes for less drag and increased speed. I have had excellent results from these streamline airfoils.—PAUL ARDAMEL, JR., 1106 Pearl Street, Boulder, Col.

CON

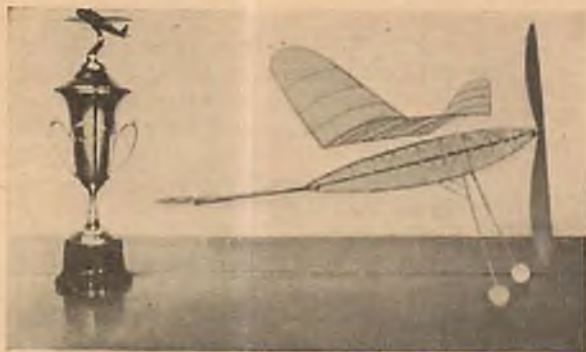
I have obtained best results with undercambered airfoils. Streamline airfoils prove a distinct handicap in endurance models. They prove inefficient at the low speeds. However, they do have a limited use on speed models where minimum drag is the first consideration.—JOHN ZAWOJSKI, 255 So. Porter St., Manchester, N. H.

I think the new airfoils do not offer any advantages for models. Eiffel 400 wing section with a Clark Y in the elevator has proved itself to be the best combination of airfoils for endurance models.—STANFORD KAY, 208 Kelker St., Harrisburg, Pa.

Undercambered airfoils are superior to the streamline sections for several reasons: (1) When used on the average model they produce more lift; (2) better stability; (3) ease of construction. I have found the Eiffel 400 and K. G. 8 to give the best results on all types of models other than speed jobs.—J. ROY CURRIE, 50 Bland St., Halifax, N. S., Can.

Streamline airfoils are not useful in model design because, due to decreased lift coefficient, the model must travel at higher speeds; also, the glide would be faster with a higher sinking speed. Although the lift to drag ratio may be greater, the actual sinking speed is higher for streamline airfoils because of the decreased value of the lift coefficient. For duration models my unqualified choice is Clark Y. and R. A. F. 32.—RICHARD DUNBAR, Route #1, Shelton, Wash.

Undercambered airfoils combined with a large moment arm to the tail plus generous tail areas for stability will produce better duration than any other design. This is because undercambered airfoils give more lift at low speeds. Streamline airfoils have no place in the design of duration models.—STAN LYONS, 104 E. Spruce St., Sault St. Marie, Mich.



The 23rd Air Trails presentation of a championship model—a premier indoor design

By Alvie Dague, Jr.

In collaboration with Laurence N. Smithline

Bloomingtondale Trophy Winner

ALL that remained of a once-proud Class C tractor was the microfilm-covered wing. The rubber had just collapsed the motor stick and the delicate, microfilm-covered tail group was demolished. As Alvie Dague, Jr., walked across the floor of the Olympia Stadium that 1936 summer afternoon in Detroit, his spirits were at their lowest. For months he had carefully adjusted that indoor tractor for the Stout Competition at the National Contest, and now just as he was winding for an official flight his model blew up in his face.

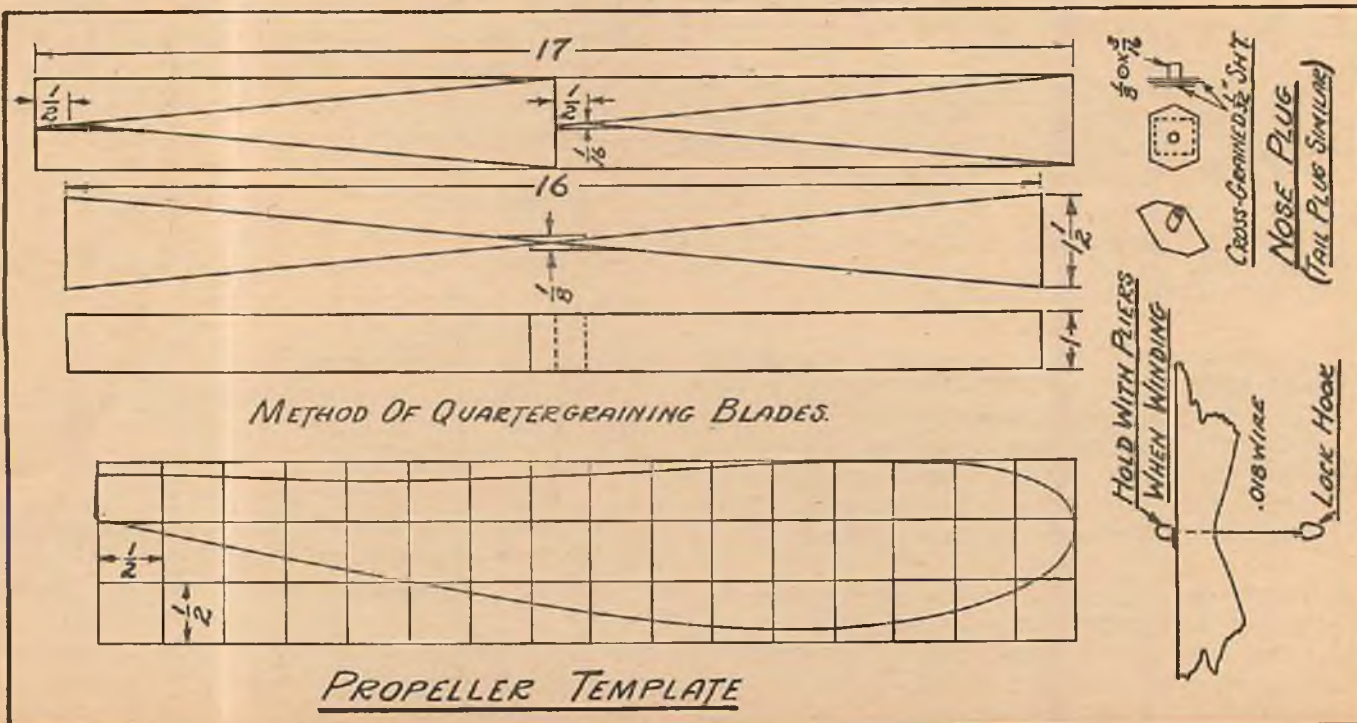
True, he reasoned, he had an indoor fuselage model, but what could one expect from a model that had a wing heavy enough to support an outdoor job? At one time that ship had been adjusted, but it had not been out of the box for months. He opened the box anyway and the model looked fine. If

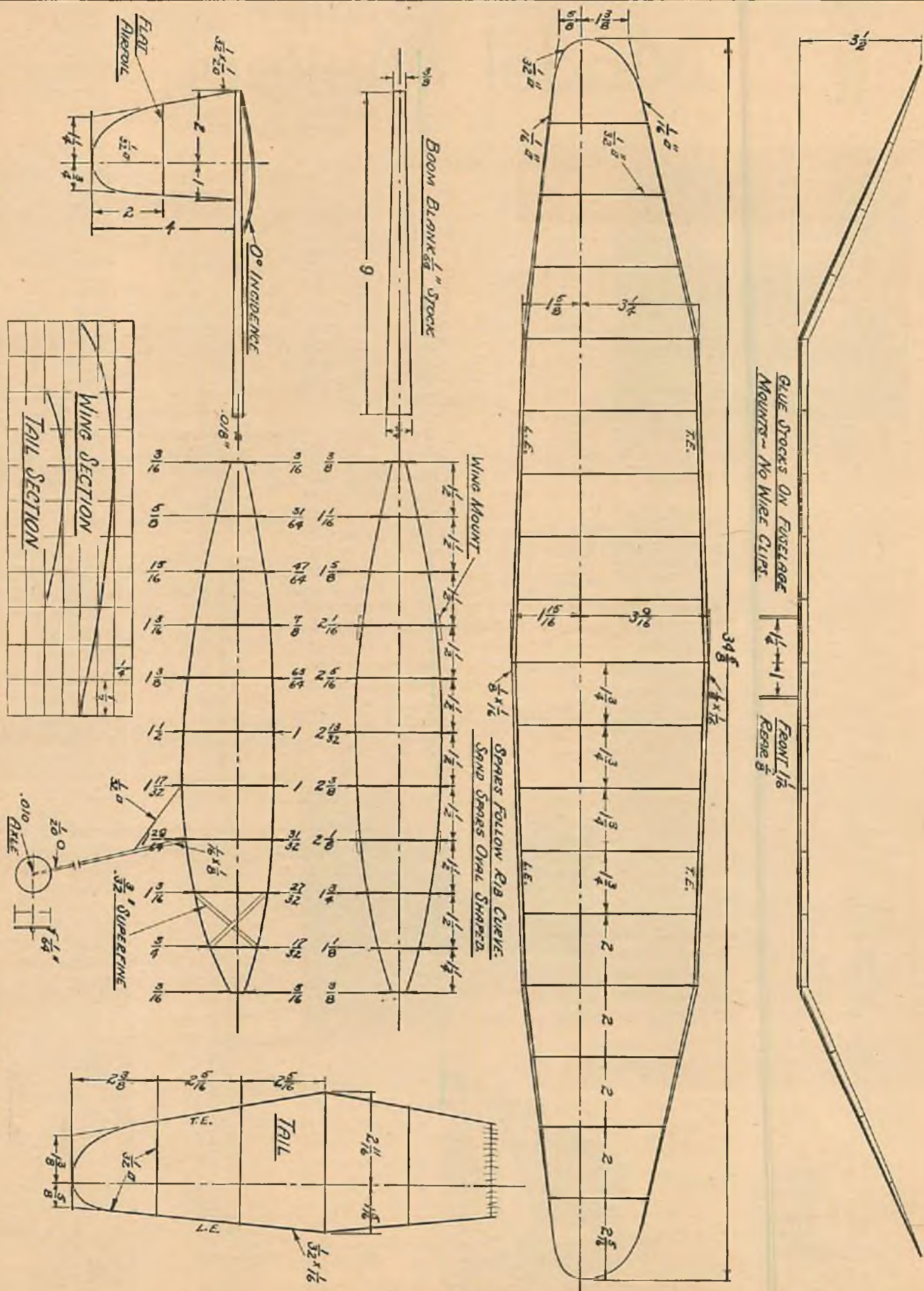
only those wing spars were lighter! And almost by accident he remembered that the tractor wing of the plane that had just been demolished was exactly the same as the fuselage wing. The stick wing, although it was quite light, seemed amply strong enough to do the job, and he immediately started to transfer the wing mounts from the heavy to the light wing. He assembled the model while hoping that the adjustment had not changed.

At four o'clock in the afternoon (which it then was) he hand-wound the model, and much to his amazement,

it did five minutes. In order not to waste a valuable minute by further test flights he wound the model 1,500 turns for an "official," in which, in spite of a stalling flight, it remained aloft for over 12 minutes. Literally shocked by such excellent results, he paused long enough to take the stall out of the (Turn to page 77)

Probably the least appreciated and understood of all phases of modeling, indoor flying richly deserves more than a haphazard criticism. In the indoor model is embodied the very acme of design, constructional and flying skill. By bringing this noted design to our readers, it is hoped that the many thousands who have never witnessed an indoor contest will gain a newer and more favorable opinion of a fine sport.—The Editor.





*Flight records
and contestants
in competitions.*

Model Matters

*Club notes and
news of model
organizations.*

(In contest tabulations, results are to be read as minutes (to left of colon), seconds, and fractions.)



J. K. Coppage, contest director of the Atlantic Aero Engineers, and his Brown-powered Super Buccaneer.



Francis Tlush's Midget-Powered Mite starting the flight that lasted 54 minutes. Right—J. K. Coppage's Elf-powered job flies at 15 m.p.h. and has made over 100 flights.

Detroit National Meet

July 6th—9th. Flying will be done at Wayne County Airport, Detroit, Mich. Irwin S. Polk is contest business manager, representing the Exchange Club of Detroit, the sponsors of the meet. Actual contest competition will be directed by H. M. Jellison of Akron. Timers will be recruited from the Army Air Corp flyers stationed at Selfridge Field. Hotel Fort Shelby will be contest headquarters, where special rates and work room facilities will be provided.

Entertainment other than model flying has been arranged to make the modeler's visit a worthwhile affair. Entrants who find transportation to Detroit a problem are advised to contact the Exchange Club in their city. Promotion of model aviation is part of the national Exchange Club program. Modelers will probably find little trouble in getting them to sponsor local elimination contests with free trips to Detroit as prizes.

Full information including rules and entry blanks are available from the National Aeronautic Association, Dupont Circle, Washington, D. C. A summary of the rules and events follows:



Left—"Spirit of 1938," flown by the Detroit Exchange Club to stimulate interest in the National Contest. Right—Ralph Brown of the Junior Aviation League, Boston, Mass., is youngest member to get ace rating.

Indoor Events

Stick Models—hand-launched—classes B and C
Cabin Models—rise off ground—classes B and C

Outdoor Events

Stick Models—area 100 to 300 sq. inches—loading of 3 ounces per 100 square inches of area—any power except gas—fuselage cross-section area must be less than (Length)²

200

Wakefield International Elimination—to pick team of six to represent this country in the finals scheduled for France later in the summer.

Cabin Models—area 100 to 200 sq. inches—3 ounces per 100 sq. inches—cross section of fuselage must not be less than (Length)²

100

—any type power other than gas. The six entrants turning in the highest times in this event represent this country in the Moffett Trophy finals.

Moffett International Competition—each country to be represented by a team of six builders.

Flying Scale Models—rules for this event, a newcomer to national contests, are still being drawn up.

Gas Models—wing loading of 10 ounces per sq. foot of area—maximum engine run of 30 seconds.

Radio-controlled Models—winners determined by the best controlled flights in the opinion of the judges. Maximum weight to be 25 pounds.

NOTE: Timers will not follow the models or use glasses to keep them in sight. Instead, they will remain within 200 feet of the spot where the model was launched and stop the watch when it has disappeared from sight.

Quaker City Club

The Quaker City Gas Model Club is continuing its monthly meets until September, when their big invitation meet will take place. The Germantown group—a division of the QCGMC—conducted the last contest, in which modelers from Trenton competed with the Philadelphia boys. In all these local club contests an entry fee of 25 cents is charged. Prizes are awarded from the total fees collected. All monthly contests are run off under NAA rules and sanction.

Club members are showing a fine spirit of enthusiastic cooperation and plans call for a strong delegation to attend the national meet in Detroit. Charles Bossi has made reservation for





Left—A line-up of some of the 51 planes entered in a contest at Yakima, Washington, airport. The four pictures on the extreme right were taken of activities in the same section.



Carl Van Court tinkers with his Elf-engined baby streamliner at a meet in Grandview, Washington.

model space in the club trailer—which will be making the longest trip in its history—to Detroit. Walt Eggert, Jr., and William Beck will also be sending their gas models to Detroit by this method.

Club Director Beery represented the club at the First Model Airplane Conference held during March in Washington, D. C.

Chicago Park Contest

The Chicago Park District held a class A glider contest at the 124th Field Artillery Armory on February 19th. This was the first of a series of four such indoor meets. The Chicago boys really went to town with their gliders. Milton Hugulet turned in the highest time—51.2 seconds. Wally Simmers, Chicago's ace glider flyer, came a close second with 51 seconds. The following times are all based on a 3-flight average:

Juniors

1st: Louis Tucker (Ries Leader's Club) :40.7
2nd: Ed. Sjoboda (Brands Park) :32.2

Seniors

1st: Milton Hugulet (The Aeronauts) :49.6
2nd: Wallace Simmers (The Aeronauts) :49.0

W. P. A. Exhibit

Workers employed by the Works Progress Administration are developing an exhibit depicting the history of avia-

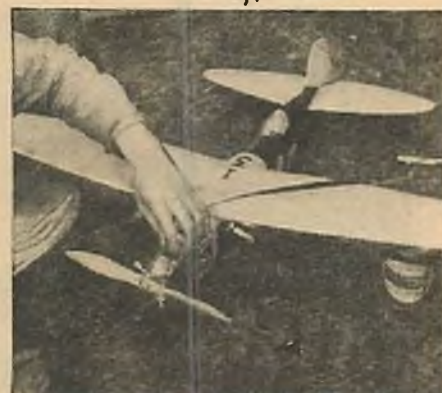
tion in the United States. The exhibit is housed in the U. S. Army Aeronautical Museum at Wright Field near Dayton, Ohio. Models of the planes which made aviation history are being built. In addition there will be models of airports, hundreds of feet of film of early Air Corps history, and more than 100 different types of airplane motors. Visitors to the museum will be able to trace the progress of aviation from the first efforts of the Wright Brothers to the latest Flying Fortresses.

Dayton, the home of the Wright Brothers, is the logical place for such an exhibit. Wright Field is the experi-
(Turn to page 84)

Below—Richard Lober, Ft. Lewis, Washington, working on his 5½ ft., Cyclone-powered gas job.



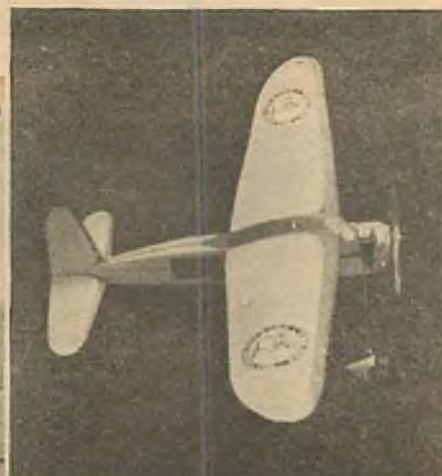
A sleek-looking job powered by a Baby Cyclone. This trim ship is the work of Stuart Tinsley, Seattle.



A racing model powered by the experimental "Bee" engine, both built by Richard Scheerer and associates.



Pete Bowers, Los Altos, California, built this inverted Cyclone-powered ship. The one-bladed prop improved performance considerably.



Carl Van Court's "Tuts 17," a cleaned-up version of the standard design recommended by Elf.



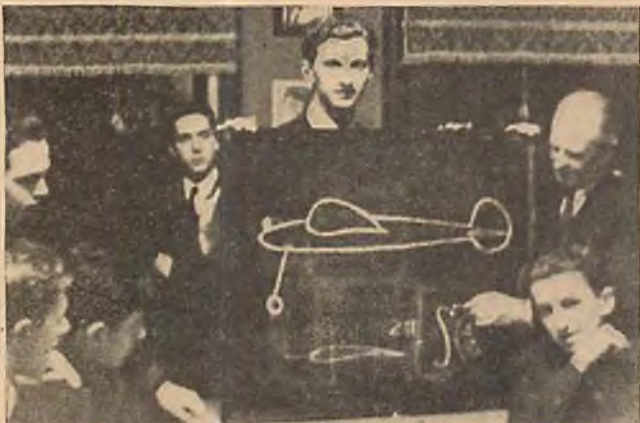
John Roman, New York City, built this balsa R. O. G.



Richard Kehr, Jr., Philadelphia, and his Quaker Flash.



Edwin Godshall, Philadelphia, and his Husky-powered "Falcon."



Members of the Illinois Club during a discussion.

Contest Calendar

READERS AND CLUBS. Notices should be mailed to the Contest Calendar, Air Trails, 79 7th Ave., New York City, 5 weeks in advance.

GAS MODEL MEET, May 21st, Martin's Creek Airport, near Easton, Pa. Four events: duration with 30-second motor run; payload; precision; and beauty of construction, design, and finish. \$100 in model material for prizes. Entrance fee, 25 cents. Further information from LeRoy Weber, Jr., Blair Academy, Blairstown, N. J.

FIRST ANNUAL MODEL CLASSIC, sponsored by the Philadelphia Gas Model Association, Sunday, May 29th. Timer flying will probably be the order of the day, with plentiful prizes. For further information contact Mr. Jesse Bleberman, 3219 E. Brighton St., Philadelphia, Pa.

NORTHEASTERN STATES MEET sponsored by the Junior Aviation League of Boston, Mass. Open to modelers from all sections of the country. Indoor flying at the Boston Garden, June 4th; outdoor events at the Harvard practice field, June 5th. A full list of trophies, plaques, cups, gas engines and other awards. Information and entry blanks from Al Lewis, Junior Aviation League, Jordan Marsh Company, Boston, Mass.

ANNUAL MODEL AIRPLANE CHAMPIONSHIP MEET, June 5th, for rubber-powered models, August 7th for gas models. Sponsored by the Flying Keystone Model Airplane Club. Rubber events will include hand-launched gliders, stick and cabin models and the Wakefield events. Gas events will be announced later in the season. Prizes will include merchandise, medals and trophies. For further information and requests for entry blanks write to Flying Keystone, Y.M.C.A. Building, Center Square, Allentown, Pa.

GULF STATES MODEL AIRPLANE MEET, June 18th and 19th, New Orleans, La. This will be the first meet of its kind and size ever held in this part of the country. Any N.A.A. chapter or individual in good standing is invited to compete. Events will be as follows: flying scale, endurance C and D, gas, and exhibition scale. Entries will be accepted from Gulf states only—Texas, Louisiana, Mississippi, Alabama and Florida. All correspondence should be addressed to Gulf States Model Meet, c/o Delgado Trades School, 610 Park Ave., New Orleans, La.

STIX, BAER, AND FULLER NATIONAL ELIMINATION CONTEST, June 23rd-25th. Winners will represent S.B.&F. at the National Meet in Detroit in July. Modelers in vicinity of St. Louis are eligible.

NEW JERSEY STATE GAS MODEL CHAMPIONSHIP MEET, Hadley Field, N. J., June 25th. The meet will be under the direction of the Linden Model Aircraft Club and their senior adviser, Frank M. Kryslak. Only residents of New Jersey will be eligible and the winner will be recognized as the state champion. More than likely, however, an event for out-of-state flyers will be added to the events. Prizes will include permanent trophies, medals, gas engines, and kits. Entries will be limited to 100 competitors and will be received by mail only. An entry fee of 25 cents will be charged. Full information is available from Frank M. Kryslak, Old City Hall, Linden, N. J.

ANNUAL CONTEST of the Ace Model Club, Marshalltown, Iowa. Tentative date July 4th; announcements to be made later. For further information address Ace Model Club, 19 South Center Street, Marshalltown, Iowa.

NATIONAL CONTEST, Detroit, Mich. Date tentatively set July 6th to 9th, Inc. Complete list of N.A.A. contests for the National trophies. Information and entry blanks, National Aeronautic Association, Dupont Circle, Washington, D. C.

MIDWESTERN STATES GAS MODEL CONTEST, August 7th, 1938, at Chicago, Ill. Sponsored by The Chicago Gas Model Aeronauts. Information from R. L. Weber, 217 N. Desplaines Street, Chicago, Ill. Contest open to all modelers. One event—limited engine run consistency event.

ANNUAL GAS MODEL CONTEST, Miller Field, Staten Island, N. Y. C., sponsored by the Richmond Model Flying Club. Tentative date August 14th; announcements to be made later. For information address Richmond Model Flying Club, 26 Bond St., Staten Island, N. Y. C.

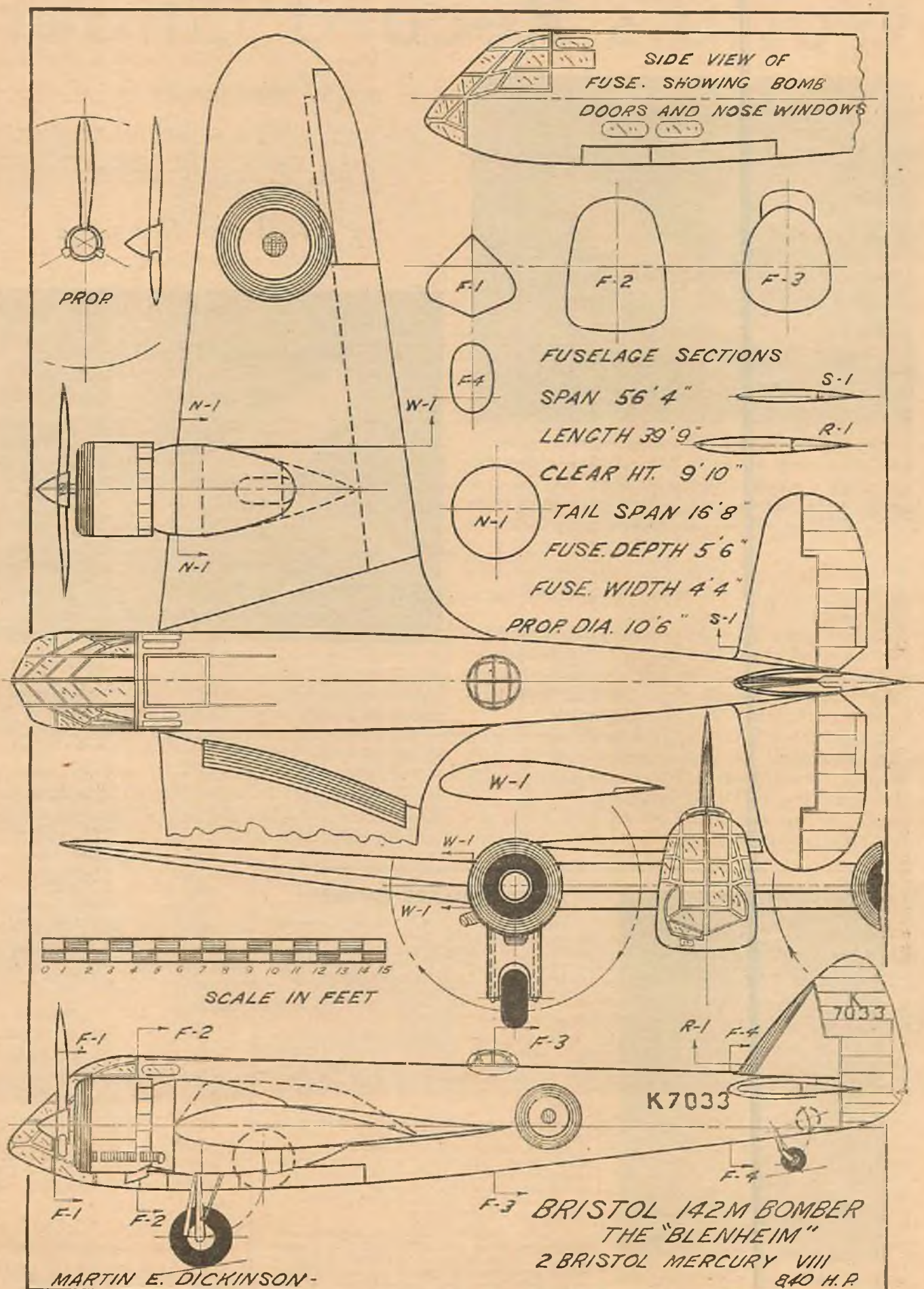
SIXTH ANNUAL MISSISSIPPI VALLEY TOURNAMENT, August 13th and 14th. A full list of indoor and outdoor events. Any modeler eligible. Trophies, medals, merchandise, trips, and other attractive prizes. Information from Contest Director, Stix, Baer, and Fuller Model Club, St. Louis, Missouri.

SECOND ANNUAL TRENTON EASTERN STATES GAS MODEL MEET sponsored by Trenton Chapter of the N.A.A. Permanent trophies and cash awards for first place winners; numerous awards for other place winners. Date: Sunday, August 21st; place: Mercer Airport. For further information address the Trenton Aero Society, 212 Centre Street, Trenton, N. J.

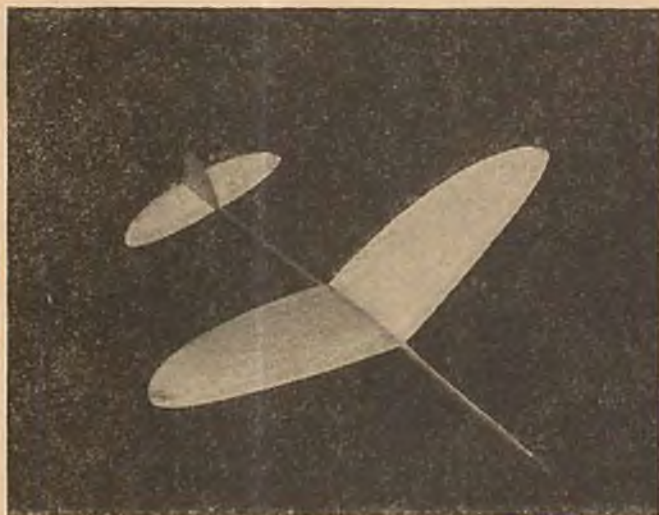
FIFTH ANNUAL OUTDOOR FLYING CONTEST, Lebanon, Pa., August 27th. Sponsored by the Lebanon Exchange Club; a full list of outdoor events—gas and rubber-powered models. Information from Contest Director, Lebanon Exchange Club, Lebanon, Pa.



Ed Lidgard's gull-winged Wakefield job at the Municipal Airport in Chicago. The ship has beautiful lines.



World's Record Glider



Imagine the smooth, hard throw launching of the glider, its lightninglike ascent and finally its spiral glide—a glide that lasts nearly a minute, considerably longer than the average flight of a powered model. The pictures attest to the quality of this the 24th Air Trails trophy-winner presentation.

THIS model won for me the Class B senior indoor glider record, which has had the good fortune to remain unbroken for two years.

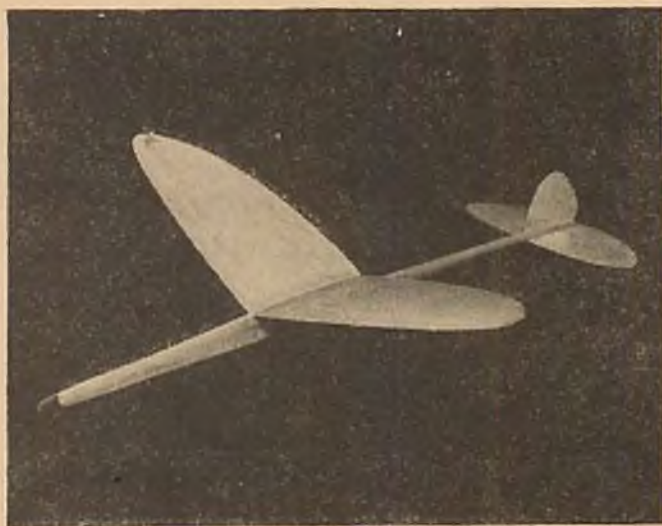
The first model of this design made a 57-second flight. Due to deep nicks made in the wing by light suspension cables, further increase in time was impossible. The second model suffered a similar fate. The third model, however, met fate with a smile in the spring of 1936.

At an official N.A.A. record trial contest staged by the Chicago Aeronauts, the present record of 58.4 seconds was set. It was cold and damp, due to recent rains. Any advantage to be gained by the cushioning effect of ground compression was lost because of the hard, lumpy dirt floor. The first flight yielded 56 seconds. Subsequent

A model that set an N.A.A. record of 58.4 seconds for Class B indoor gliders

By Wallace Simmers

In collaboration with Gordon S. Light



flights were 57.2 seconds, 58 seconds and finally the record-holding 58.4 seconds. An inexperienced bystander ruined all chances of any increase in time when he destroyed the ship in an attempt to catch it as it neared the ground on a later trial.

The model used in breaking this record represents the latest developments in present-day glider construction. Every minor detail has been evolved from long experience and painstaking work.

WING

The wing shape varies from the more common so-called double or distorted ellipse. The reason for this variation is two-fold. First, a double elliptical outline tapers too rapidly. It is desirable to have a wide chord for as great a length of the span as possible, in order to get away from the flat plate effect of the thin, narrow tip section. Secondly, it is much easier to make the entire wing a true airfoil section by using less pointed taper.

The airfoil is one which experience has proven to be very good. The L/D ratio is high. This has been proven by flight tests (*Turn to page 90*)

ABOUT WALLACE SIMMERS

"Wally" has been building models since 1929. He began with small R. O. G. models. Since he was the lone modeler in his home town, New Lenox, Illinois, much of his early experience was the result of trial and error technique. While this method is sometimes discouraging, it is certainly effective. And Simmers soon found himself among the country's best.

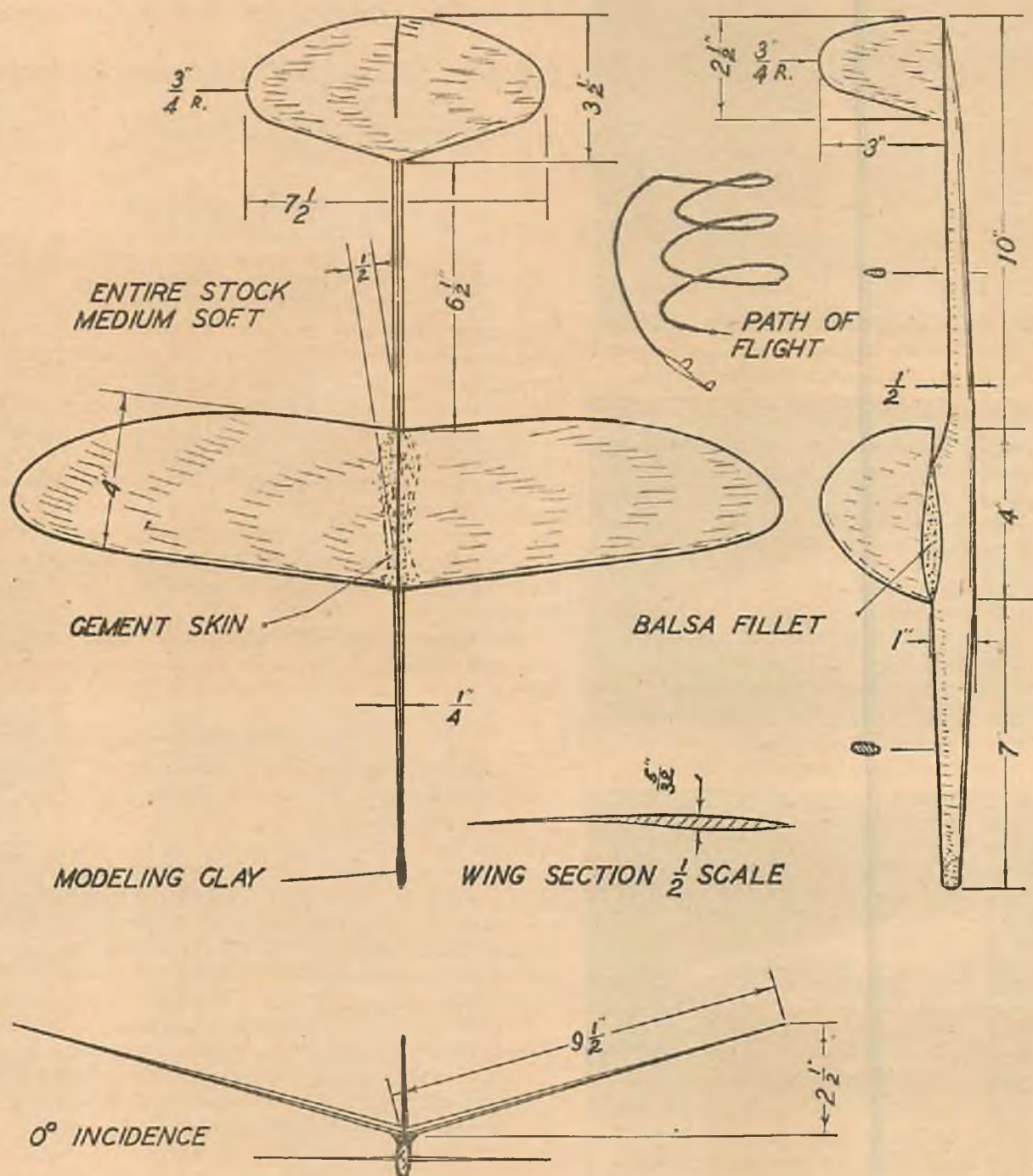
He won his first trophy at the 1935 Nationals in St. Louis. Ever since this contest, he's been collecting trophies. His present collection numbers 14—the outstanding one being the Stout Indoor Trophy which won the 1937 Nationals in Detroit.

Simmers' performance outdoors is of the same championship caliber as his indoor technique. A high rubber-weight-to-structural-weight ratio is his stand-by. His theory is to fly as often as possible—literally fly the pants off a model—as it is better to obtain maximum performance from an old model than to get average performance from a new job.

He is president of the Chicago Aeronauts and sets the pace for this active group of record-collectors. Simmers holds the Class A and B indoor glider records and the Class B indoor stik. But before this contest season is over he'll probably have added to these.



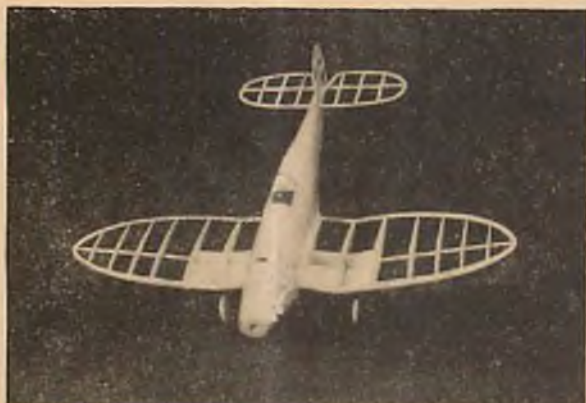
Wallace Simmers, glider expert and holder of the Stout Indoor Trophy.



WT. 56 OZ. AREA 58 in^2
 GL. ANGLE 13 to 1
 BEST TIME 58.4 SEC.
 1 COAT WOOD FILLER
 2 POLISH 1 WAX

CLASS "B" INDOOR GLIDER
 SENIOR WORLD RECORD HOLDER
 DESIGNED BY
 WALLACE SIMMERS
 CHICAGO AERONUTS

Super Speed for Germany



The hollowed balsa fuselage makes for structural strength and an unmatched polished finish.



The wings are elliptical and form an inverted gull. Cockpit and gun troughs are cut out.



The profile of the finished ship reveals the fine streamlining. Even the painting is to scale.



Ready to fly, the model is as formidable looking as its 300 m.p.h. prototype.

Detailed plans of an ultra-modern fighter in which appearance is emphasized—the Heinkel pursuit.

By Paul Plecan

A MODEL of the Heinkel is one that is sure to be appreciated by any model builder. Its inverted gull wings and smooth fuselage give it a truly beautiful appearance. The original is powered with the "Jumo" of 685 horsepower, and is "armed to the teeth." There is a machine gun located on each side of the motor, a quick-firing gun in each wing, and there is a compartment in the under side of each wing stub for a total of six 22-pound bombs. The top speed of the HE-112 is 292 miles per hour, the cruising speed is 267 miles per hour, and the range is 680 miles with full military load. The model is a very fast flyer, and the enlarged stabilizer should be used if the model is built mainly for flying. When building the model, keep in mind the fact that a light tail is desirable, since the tail is so far back.

Since the prototype is all-metal, we will make our model out of a solid balsa block, to retain the smooth appearance of the original.

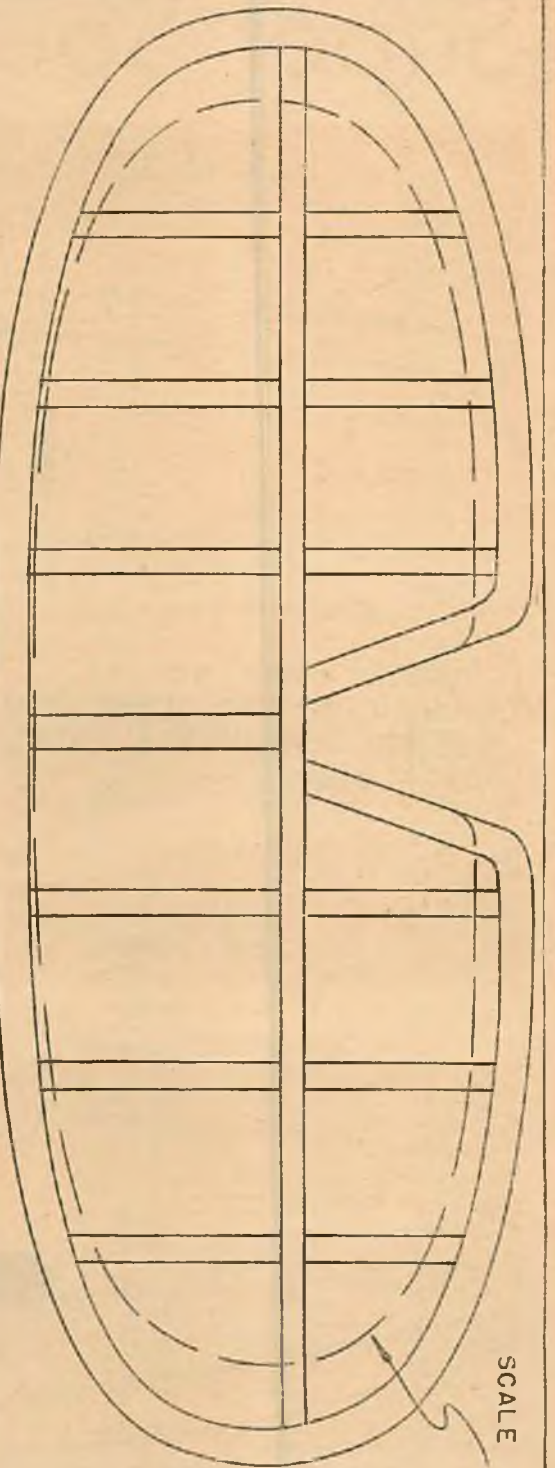
FUSELAGE

Two blocks of the required size are selected for the fuselage. These blocks should be soft enough for easy hollowing, and should be identical as to weight. Cement the blocks together and trace the side view of the fuselage on one side. Cut to shape with a jig saw, and then trace the top view onto the top of the block, cutting to shape again. Using the templates for reference, carve the outside of the fuselage to the proper shape. Remember that the wing stub-fillet is carved into the fuselage, this method being easier than that of carving a separate fillet which is ordinarily cemented between the wing root and fuselage.

After the carving has been completed, give the fuselage a coat of clear dope and sand down. A better finish can be obtained with the use of wood filler, however. Brush the wood filler on cross-grained, and follow with successively finer sandpaper. The fuselage may be split open at this point and hollowed out to the thickness shown on the plans. Due to the (Turn to page 86)

Right—The landing gear is retractable. This and the numerous, carefully reproduced details are the result of the design stipulation that duration be curtailed to allow perfection of reproduction. The glistening finish and smooth lines make the finished model a thing of beauty and grace.

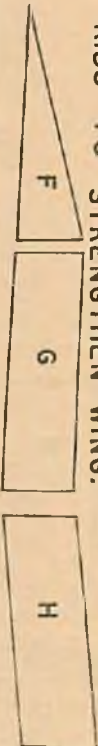




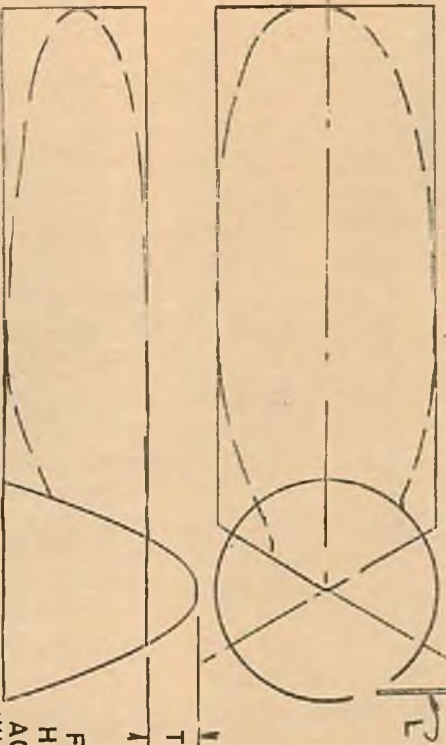
SCALE STABILIZER OUTLINE

ALL THE BALSA USED IN CONSTRUCTION OF RUDDER AND STABILIZER IS $\frac{1}{16}$ THICK

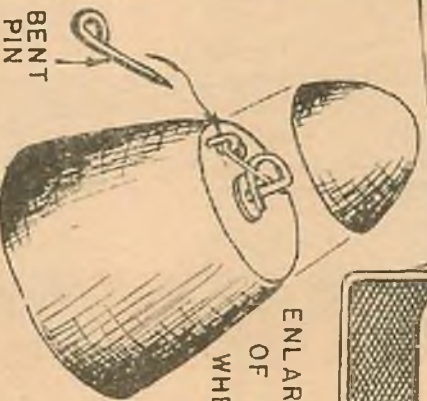
CEMENT THESE PIECES BETWEEN RIBS TO STRENGTHEN WING.



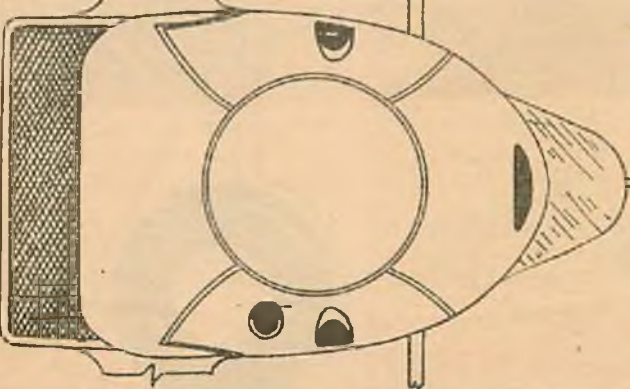
PROP FOR FLYING-(SPINNER MAY BE OMITTED)

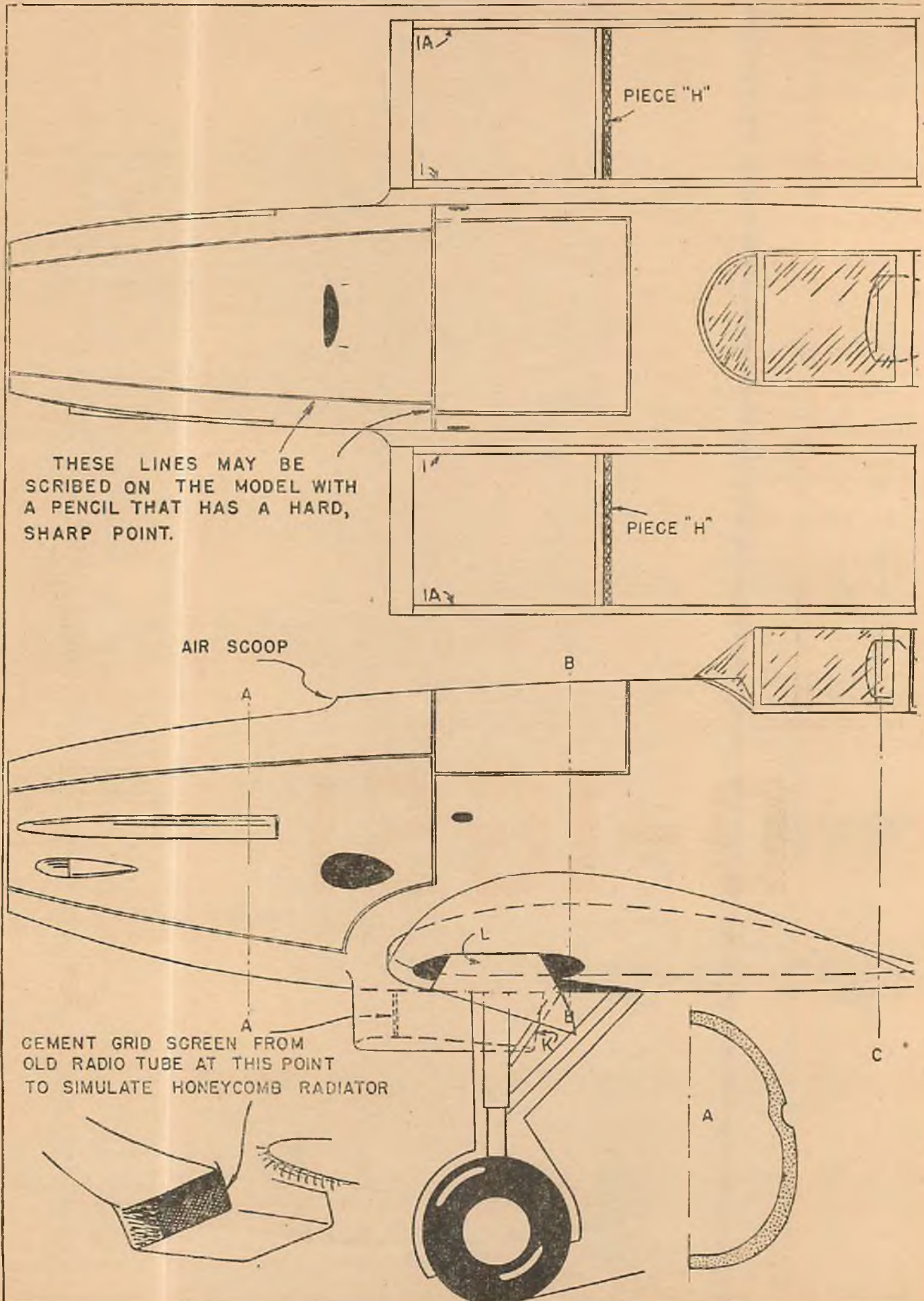


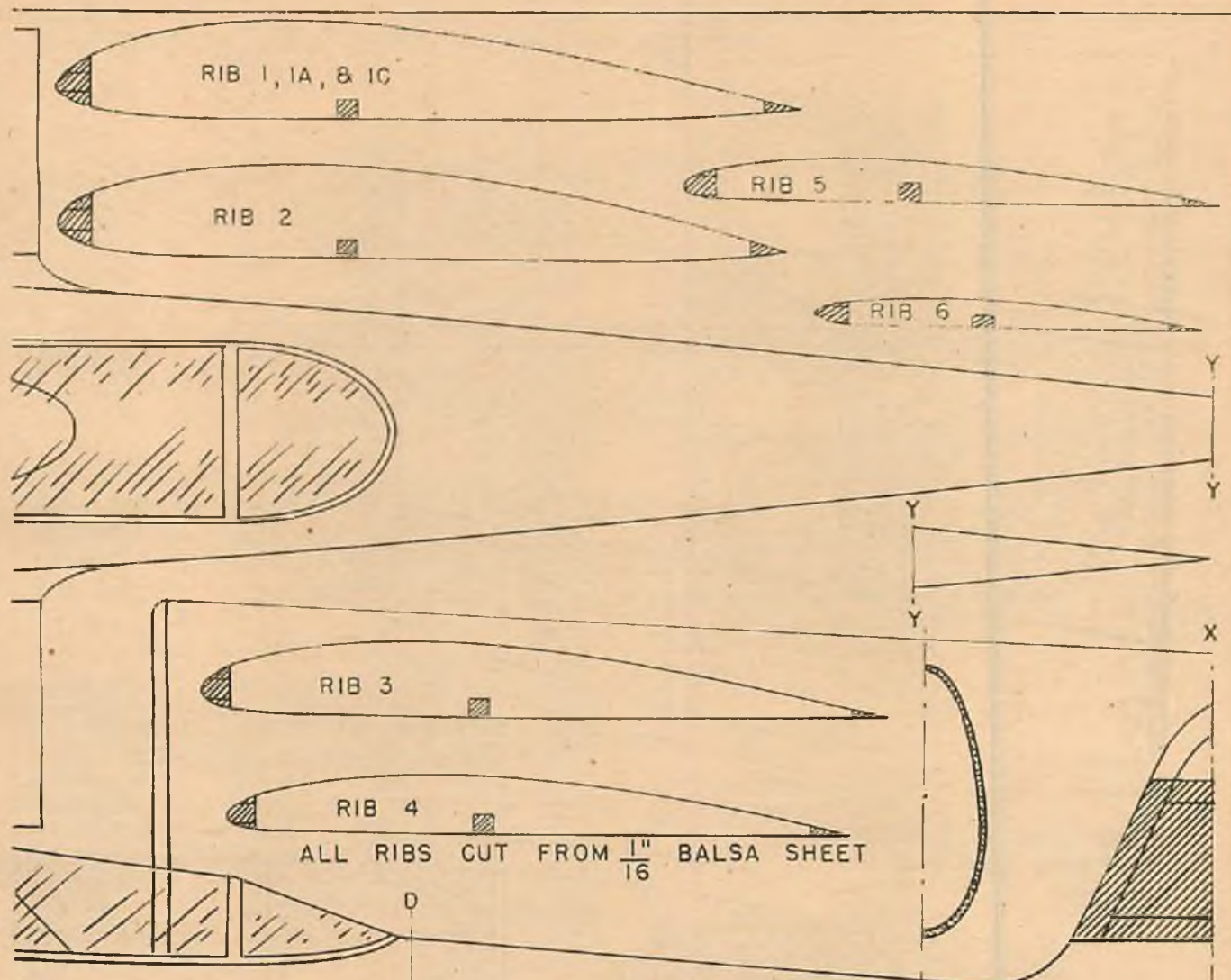
THIS CAP IS CEMENTED ON AFTER THE REST OF THE SPINNER IS FINISHED. IT MAY BE HOLLOWED OUT TO ACCOMMODATE A FREE-WHEELER. SEE SKETCH.



ENLARGED SKETCH OF FREE-WHEELING DEVICE.

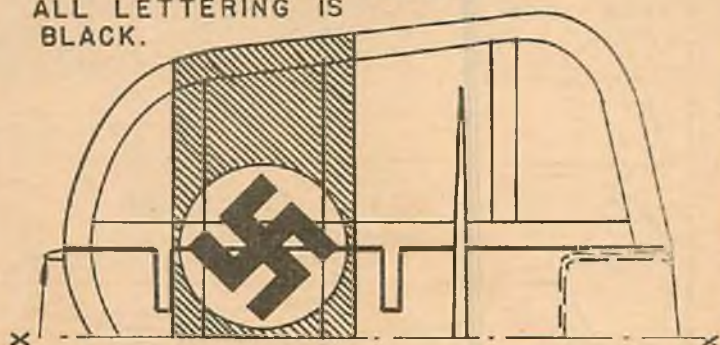
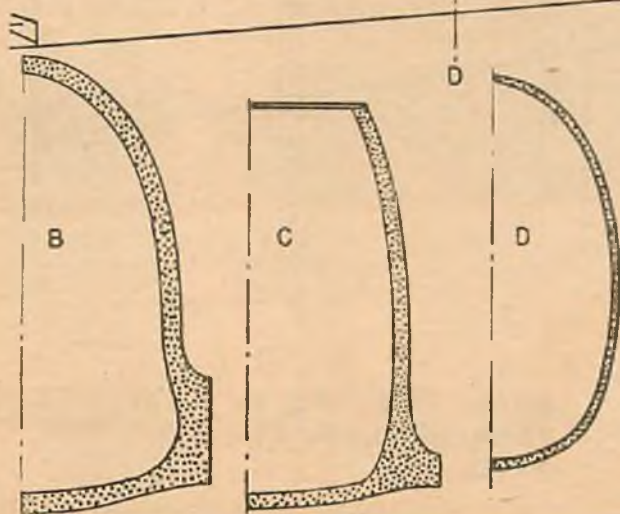


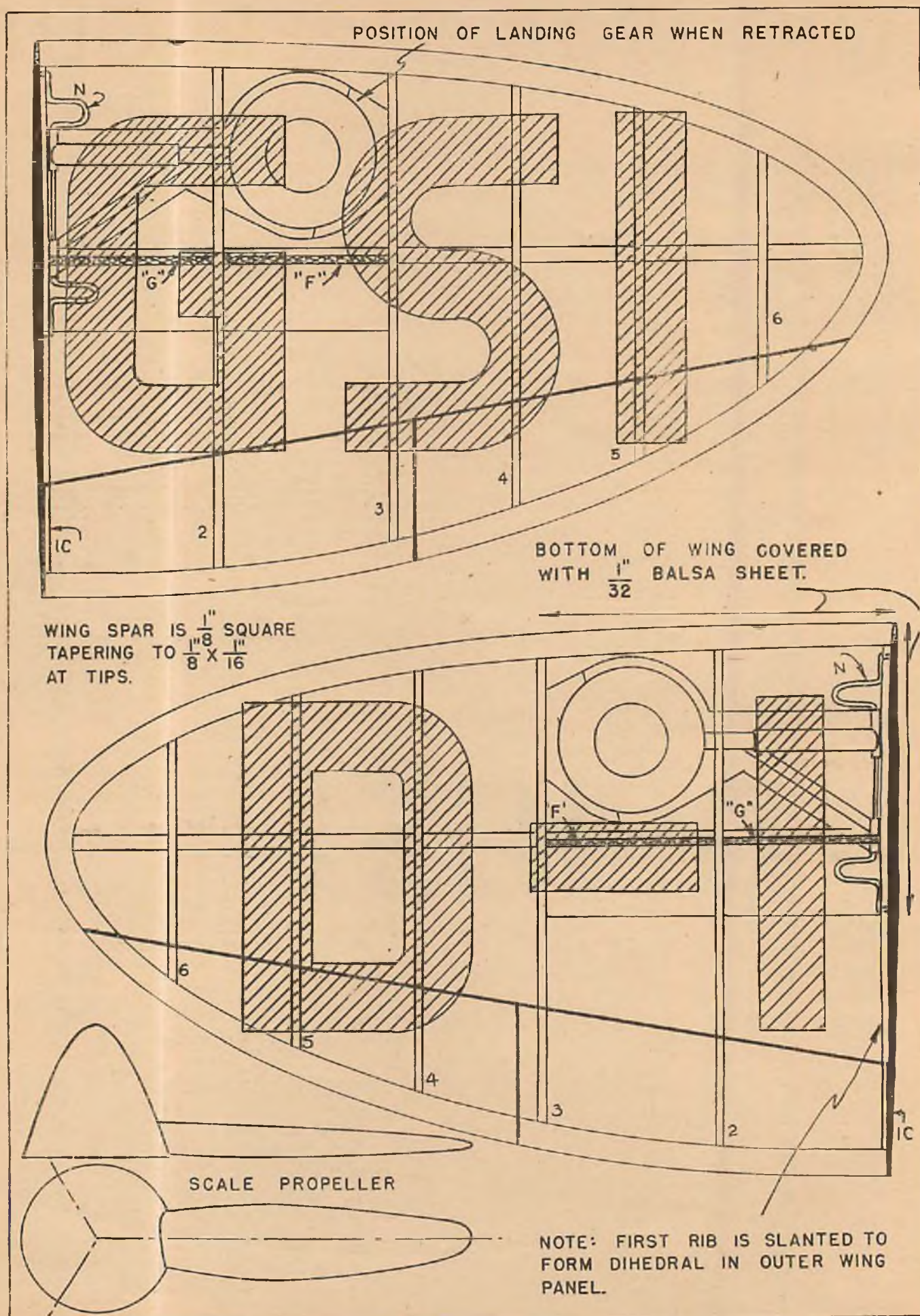




D-IGSI

RED BAND AROUND RUDDER
WITH WHITE CIRCLE IN
THE CENTER. SWASTIKA AND
ALL LETTERING IS
BLACK.





The 1938 PIPER CUB

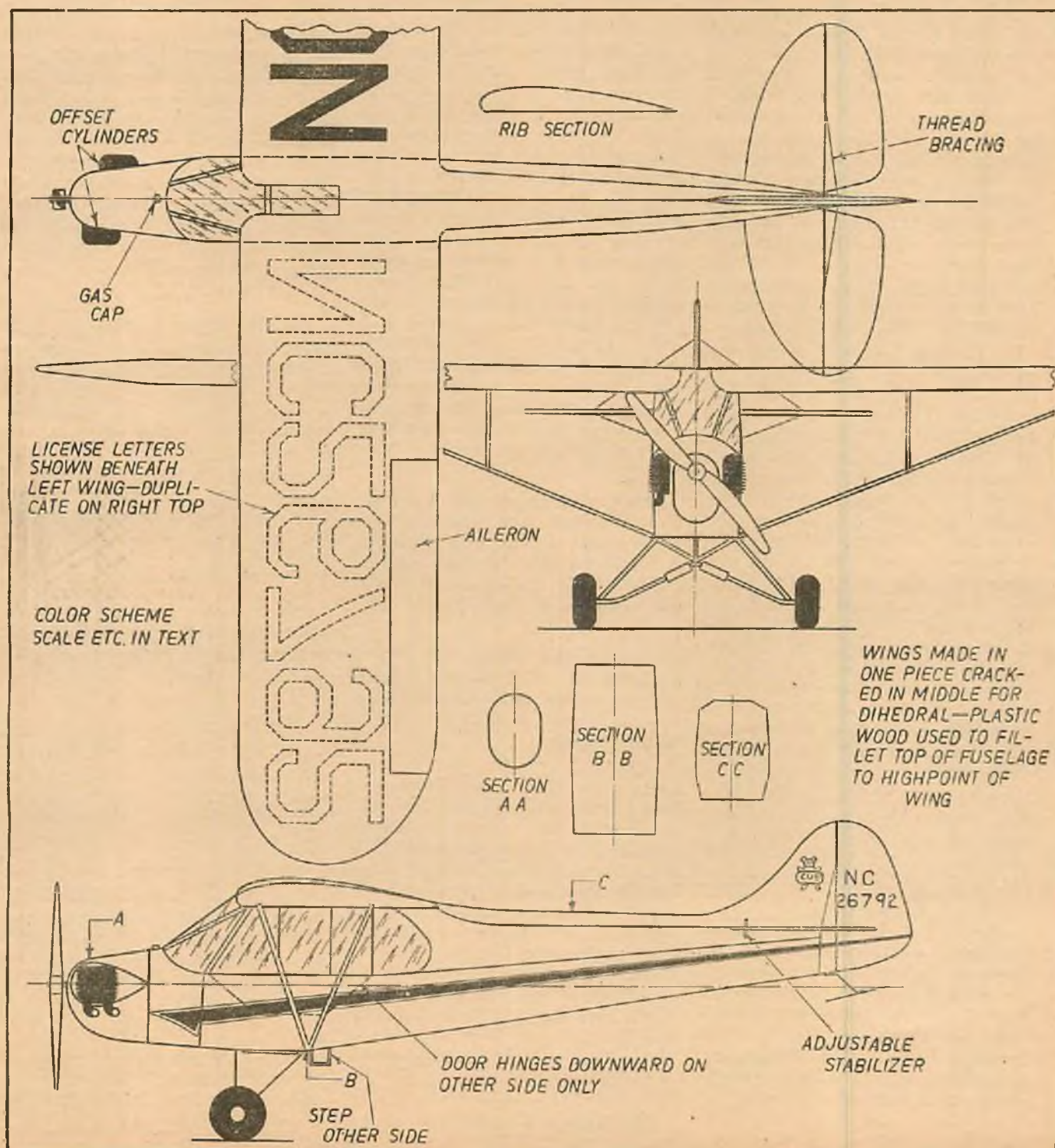
SHAPE a soft block of balsa $5\frac{1}{4} \times 1\frac{1}{4} \times \frac{5}{8}$ " to the outside required dimensions

of the fuselage. Mark the profile of the fuselage on the widest side of the block and cut away the excess wood. On the top of the block mark the width outlines of the fuselage and again carve away the surplus balsa. Use heavy $\frac{1}{32}$ " sheet for the tail surfaces. Cut them to profile and sand the edges and surfaces. Make the wing from $\frac{3}{16}$ " sheet, first cutting to outline, then shaping to

By William Winter

the requisite wing cross sections, finally sanding to a satin finish. The wing may be left

in one piece and cracked in the center for dihedral. Assemble with thickened cement. Coat the model with clear dope to fill the pores and, when dry, resand. Cement the landing gear, cylinder heads, and other details, in place. For coloring, silver is suggested with black trim. Paint the windows white and trim with delicate, black lines. Cut the propeller from a scrap of wood.



GLIDING AND SOARING

(Continued from page 33)

distance records were set over this type of terrain. Victor Rastorguyeff of Russia set the world's distance record of 405 miles by flying over the flat steppes of Russia. Last year Peter Riedel of Germany, a participant in the 8th National Soaring Contest, showed us that this kind of soaring is possible right here as well as in Europe. He made two round-trip flights between Roosevelt Field and New York City in one day, and on another occasion stayed up for eight hours.

The only drawback to soaring over flat terrain is that thermals are weak near the ground, and the glider has to get to an altitude in the neighborhood of 1,000 feet before the thermal's strength is great enough to start carrying the ship up. The easiest way of reaching such height is by airplane tow, but this is a rather expensive method, besides necessitating airplane tow permits for both the glider and the pilot. A more economical and practical solution is towing up with a winch. Given a field large enough where approximately 4,000 feet of rope can be used, altitudes of 1,500 feet can easily be attained.

Until recently the towing of gliders by an automobile was very popular, but this necessitates a field that is hard and smooth, so as to give good traction and not put undue hardship on the car itself. The winch tow method does not impose any strain on the motor whatsoever, if the mechanism is properly designed. All towing is started in third gear and if the engine has enough reserve power the strain on it is not even noticeable. Care must be the watchword of the operator of the winch. He has to know the velocity of the wind and judge the towing speed accordingly. Once the ship is in the air the towing speed is slackened a mite so as not to impose undue loads on the glider, as the ship is actually more in the role of a kite than an aircraft while climbing on the winch.

Eventually, when launching equipment is better developed, most soaring flights will undoubtedly be made from winch tow over flat country.

CLUB NEWS

A meeting of the Metropolitan Soaring Society was held recently at the Engineers Society, 29 West 39th St., New York City. Frank Apgar delivered a speech on winch operation and a collection of photos belonging to Hans Groenhoff, brother of the famous German soaring pioneer Gunther Groenhoff, was shown through a stereopticon.

Hawley Bowlus, pioneer sailplane con-

structor, is building a high-performance soaring ship for Jack O'Meara. The ship will be equipped with flaps, retractable landing wheel, radio, lights, and will carry instruments for cloud soaring.

Dan Sanborn, of Redlands, Cal., who brought his two-place Grunau 8 sailplane to the Elmira Contest last year, is busy building a two-place machine of his own design. It's going to be a high-performance mid-wing sailplane.

Southern California is the scene of much gliding activity these days. The Associated Glider Clubs of Southern California have nine ships owned by various members. They are Roland Felters' two-place primary, which has been soared for eight hours; a sailplane designed and built by Carl Goler; another sailplane designed by Goler, Yates and Palmer; Brown's "Swift;" a Bowlus owned by Graham and Gallagher; a side-by-side two-seater owned by Baker, Winter and Roberts; another Bowlus, slightly modified, whose owner is Jerry Littell; a tailless ship designed by Robertson, Fetters, Freel and Kitteridge and built by the San Diego High School; and a Waco primary flown by Dick Essery. In addition to these there are a number of ships still under construction and in the design stage.

Members of the Purdue University Glider Club have been flying their Gross F-5 four-place sailplane from winch tow. A two-place utility has been designed and built by W. W. Moore, and the ship has been flown and proved successful.

Emil Lehecka (Silver "C" 237) is equipping his Rhoensperber sailplane with an electric bank-and-turn indicator. This looks as if Emil is out for altitude records.

From the West Coast comes word that Harvey Stephen's sailplane is at the Bowlus glider factory undergoing repairs. The nose was considerably damaged during a hard landing. A special new glass hood is also being made. It will be formed in one piece, over 4½ feet long. . . . At the end of a day's flying at Redondo, Cal., featured by a strong west wind, Jay Buxton reached an altitude of over 4,000 feet and flew all the way down to El Segundo, but was forced to turn back and land at Manhattan Beach because of the crowds at the former place.

The Airhoppers Gliding and Soaring Club and the New York chapter of the

National Aeronautical Association, held a joint meeting recently at the Hotel Roosevelt, New York City. The program was arranged chiefly for those not acquainted with motorless flight and fully two hundred people attended.

Lewin Barringer, Manager of the SSA, gave an interesting talk on the history of gliding and on the technique of high-performance soaring. This was followed by the showing of the English film "Plane Sailing," which depicted the methods of instruction from the primary stage to thermal soaring. The meeting was such a success that the Airhoppers are planning to hold a series of them in the near future.

The Middletown Glider Club of Middletown, N. Y., is renewing its activities. Members are busy in their workshop constructing a secondary glider designed by Doug Warner, the president. Arrangements are being made to hold an indoor model airplane and glider exhibition for the purpose of raising funds. The club wishes to increase membership and invites all those interested to join, those holding power plane licenses being especially welcome.

Gus Scheurer of the Aero Club Albacross informs us that their gliding field at Liberty Corners, N. J., is being considerably enlarged. There will be six new sailplanes operating from it this summer. Gus, who originated the winch-towing method in this country, is working at present on a standardized winch design. He intends building parts which can be purchased by clubs and thus simplify their problem in this respect.

Don Lawrence, President of the Associated Glider Clubs of New Jersey, is contemplating the designing and building of a power glider.

The Falcon Glider Club of Pittsburgh, Pa., intends to import a Polish PWS 101 sailplane for high-performance soaring. One of their members, who just returned from Poland, put in 50 hours in this type of ship over there.

The Soaring Society of America has purchased a Ross-Stephens sailplane from Harland Ross. With this ship Lewin Barringer intends to make a tour of the country to create interest in the gliding and soaring movement.

From California comes the word that at least seven new high-performance sailplanes are being finished up in time to enter the National Soaring Contest at Elmira, N. Y.

BLOOMINGDALE

(Continued from page 62)

flight and then put in 1600 turns just to see if there were any more surprises in store. There were! By the time the watches said 9 minutes the model was near the ceiling dodging lights, rafters and other planes. On the way down it got caught with another ship and started to spin down, but they got free and went on flying. When it touched the floor the time was 16 minutes, 17 seconds—and the Bloomingdale Trophy was won.

At the 1937 Nationals, which were held in the Grosse Isle blimp hangar, Alvie Dague was well prepared—he had his old fuselage model and two new ones. On the first trial, the rubber broke and ruined the fuselage on one of the latter. After working all day with his tractor and the other new model without much success with either, he again turned to his old fuselage model. It was about four p. m. again when he assembled the 1936 winning ship.

It turned in a very satisfactory test flight and only minor adjustments were necessary to get it into top form. On the first flight he put in 1650 turns and let it go. Valuable turns were lost as it hit another ship about four feet above the ground, so that the take-off had to be done over. The climb of the ship was very good but not nearly as peppy as the year before. It got to about 85 or 90 feet and, after a very slow descent, it landed after 15 minutes, 41 seconds. His next "official" he decided would be a record trial; however, his luck had abandoned him. While winding the rubber, which should have been capable of holding 2000 turns, it broke, badly damaging the fuselage. He felt quite sure his one flight was not long enough to win the much-desired Bloomingdale, but much to his surprise the flight was the best in both senior and junior divisions. This model, Dague feels, is easily capable of breaking the 17-minute record for Class C ships.

FUSELAGE

Make full-sized drawings of the fuselage sides. Pin the longerons in place and cement in the cross-braces. After the sides are completed put in the upper cross-braces and then brace the fuselage with $\frac{3}{32}$ " superfine strips as shown in the drawing. Cover the fuselage and cement on the landing gear. Note that the landing gear struts are braced with $\frac{3}{32}$ " round struts. The wheels are made of $\frac{1}{64}$ " sheet balsa and have a $\frac{1}{16}$ " round hub cemented in the center.

WING

A full-sized drawing of the wing should be made and the spars, which

are sanded to an oval cross-section, should be pinned to it. When laying the spars down be sure to pin them in line with the rib shape. The tips can be bent around a cardboard template and then cemented in place. Cover the wing in one piece (with microfilm, of course) and then put in the dihedral. The wing mounts are cemented permanently to the wing and are not clipped to the fuselage mounts but merely temporarily attached with a dot of cement so that they can be easily removed.

BOOM TAIL AND RUDDER

The boom is bent from a blank $\frac{1}{4}$ " thick around a former to a tear-drop shape. It should be cemented to the rear plug (seam of boom on the bottom) which is made by crossgraining two $\frac{3}{32}$ " sheets of balsa, one of which fits snugly inside the rear bulkhead and the other of which fits outside. Before cementing the boom to the plug cement in place the rear hook, which is bent of .018 wire. Make the tail and rudder to the dimensions shown and insert the ribs. Note that the rudder has a flat section, and the tail a cambered section. Cover the surfaces and cement them to the boom. Both tail and rudder have 0° incidence.

PROPELLER

The propeller is made from a block of $1\frac{1}{2} \times \frac{1}{2} \times 17$ cut as shown in the drawing in order to quartergrain the blades. Cement the two halves together and carve the block in the usual manner, concave side first and then the convex side. Make a template of the blade shape and cut the blades to fit. A wire shaft should be cemented in place. Note that a special shaft is used so that the propeller may be held with a plier when winding.

ASSEMBLY AND FLYING

Cement the wing sticks on the fuselage wing mounts. Insert a $\frac{21}{32}$ " loop of $\frac{1}{8}$ " brown rubber and attach it to the rear hook and propeller shaft. Check the setting of the wing by first flying the ship with some handwinds. If the model stalls you will have to move the wing back, if it dives, forward. The model should turn in about forty-foot circles. Alvie Dague believed his model, which was his first serious attempt at building an indoor fuselage model, could do 17 minutes. Let's see if you can do it.

WEIGHTS

wing031	OZS.
fuselage and land. g....	.037	
tail group.....	.014	
prop. and nose plug...	.028	
total110	OZS.

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SHIP TO: _____ Apt. # _____	
ADDRESS: _____	

FLYING ISN'T EVERYTHING

(Continued from page 12)

graphed on a single negative, from which are printed, either by contact or projection, as many maps as are needed.

Almost any section of the United States can be photographed from the air by planes making their bases on regular established airdromes. But in sections of northern Canada—where a great deal of survey work has been done by flying cameras—in Central America and South America, where landing fields are few and far between, another and difficult job is added to making the survey.

Ground bases have to be established. Supplies of gasoline and oil have to be taken in for use of the plane. Field laboratories have to be set up for the development of the film, as it deteriorates rapidly after exposure in tropical countries. Sometimes supplies can be flown in. Again everything must be transported hundreds of miles by canoes and pack animal.

The actual time required to do an aerial photographic job may be only a few hours, but delayed supplies, unfavorable weather and accidents may run the time into weeks or even months. Trained personnel is the most important factor in aerial photography. Lack of experience and a rich man's desire to do something different caused the failure of the first aerial mapping expedition ever to be attempted in Mexico. The story illustrates a lot of don't's.

I was engaged to take charge of an expedition going into southern Chiapas, Republic of Mexico, to cruise a million and a half acres of hardwood timber, virgin jungle containing great quantities of mahogany and other rare woods.

I was called to New York to meet the lumberman who was interested enough in the possibilities of the tract of timber to finance the expedition. During our discussion of ways and means the idea of using an airplane to photograph the tract was brought up. Although one hundred per cent in favor of airplanes, I honestly had to vote against its use for this particular job. The nearest known landing place was over a hundred miles away, and that a river of rather temperamental tendencies. With the exception of the German who acted as caretaker on part of the timber tract, I was the only one that knew that part of the country, and the German knew nothing about flying.

Although I knew the country and had been flying since 1916, I was quietly but firmly overruled. I wasn't even given a voice in what kind of a plane would be selected. They purchased a

giant seaplane, of the type the Navy used in their flight around the world, on the theory that it was the biggest ship on the market and so must be the best. Never having flown seaplanes and feeling that the jungles of southern Mexico was no place to break in, I balked at acting as pilot. A naval pilot and mechanic were hired, with the recommendation of the Secretary of the Navy, and they were given leave to do the job.

The finest aerial camera at that time on the market was purchased, fifteen hundred dollars for camera and mount. Then I went to New Orleans to complete arrangements.

In the Southern port I purchased fifteen hundred gallons of high-test aviation gasoline and two hundred and fifty gallons of motor oil. This gas and oil had to be packed in five-gallon cans, two cans to the case, for facility in handling. Space was engaged on a ship sailing for Frontera, the nearest port, a frontier town on the Usimasinta River. When all arrangements had been made for the airplane I quietly set about gathering equipment for making the timber survey by land, in the good old approved manner. Although an aviator and having the greatest faith in things aviation, I did have my doubts about the success of this venture. But I was put in the unenviable position of "not to reason why," but just to go ahead and make the survey regardless.

The flying boat was lashed to the forward deck of the rusty old steamer *Rajah*. In Frontera, after a perfect passage, thank goodness, the plane was hoisted over the side and placed on the rickety old dock that looked like it had stood there since the days of the conquistadores. With the wings again attached and the plane lined up, the steamer *Rajah* nosed in to the dock and with her boom lifted the plane, drifted out into the middle of the river, a mile wide at this point, and set it gently down on the water.

The naval pilot and mechanic really knew their business. They tested the flying boat and found it in A1 condition. They flew the local military commander to the state capital and back, pausing on the way to take in a bull fight. Then they headed for the interior to do the photographic job.

Bandits were reported operating along the river, raiding outlying settlements and ranches. Someone had to be responsible for getting the supplies a hundred and fifty miles up this river in a small gasoline-powered boat, and another hundred miles into the interior by pack animals and canoes. My job.

I started a day ahead of the seaplane. Our river boat was loaded top to bottom with supplies, oil and gasoline, rich pickings for bandits, so the government sent along fifteen soldiers for protection. They fired all their ammunition at alligators the first day. The pilot house and motor were protected by sheet steel as a protection against bandit rifle and machine-gun fire, but if anything popped the rest of us had to take our chances. As we chugged away upstream I kept a sharp eye and ear attuned for sound or sight of the plane, which was to follow the river and would pass directly overhead.

At noon the second day our boat nosed into a landing at El Salto, as far as it could go upstream, the way being barred against farther travel by impassable rapids that roared down through a deep gorge for thirty miles, water so rough and strewn with boulders that even giant mahogany logs came through splintered and useless for commercial purposes. The plane had never passed us and at El Salto they knew nothing about it.

Señor Juan Martins, the old German store keeper at the river town, was excited for the first time in his life; he was going to see an airplane.

A telegraph line connected El Salto with the state capital and Frontera, and I got busy on the wire. The report that came back was anything but reassuring. The plane had left Frontera the day before and nothing had been heard from it since. I wired the military commander at San Juan Bautista and they promised to start a search for the plane.

The timber tract we were to survey was a million and a half acres in extent and for the most part had never been traversed by white man. The resident manager was a German baron, Don Max, who lived in feudal splendor in a little isolated kingdom of his own. He had run a telephone line from the hacienda to the German's store at El Salto and he informed me by wire that canoes were waiting above the rapids to transport our supplies from that point to the ranch, where he insisted there was a fine landing place for the plane. I had the supplies ferried across the river where the pack animals were waiting and saw them started on the trip to the head of the rapids, thirty miles upstream.

Just before dark we heard the welcome drone of the plane's motor and every native in the district gathered at the water's edge to watch the arrival of the man-made bird. It glided down to a graceful landing and came to rest with its nose against the shore where

we were waiting. They had a story to tell.

Instead of following the river the pilot had tried a short cut, following a compass course that he had worked out from a ground map that was a hundred miles out of place. They had picked up the river again, but it was not the right river. They didn't know that.

They had followed this river until it dwindled away among the mountains and lakes from which it headed. They saw a collection of huts at the edge of one of these lakes and landed to get their bearings. It was an hour before the Indians living in the huts got up enough courage to come out and talk to these strange visitors, and then none of the plane's party could speak Spanish. With the aid of a dictionary they finally figured out their position, but by that time it was dark.

The next morning they took to the air and backtracked until they came to the river again, only to discover when it disappeared into a hole in the mountain that they were again on the wrong stream.

Again they retraced their route and this time they reached the junction of the rivers and there they anchored for the night, hungry, eaten alive by mosquitoes, and with the gasoline supply getting low. The next day fog on the river was so heavy they could not take off until after noon. They headed upstream, this time on the right river, and landed at El Salto, weary, frightened, but thankful that they had found their way out of the maze of rivers.

I was away early the next morning to push along the supplies. Before my horse had carried me halfway to the head of the rapids, the plane roared past overhead and I could see the mechanic leaning out, looking down into the gorge of seething waters where no man had ever looked before and lived to tell of what he had seen. I felt puny and insignificant down there in the mud of the trail, with giant trees towering two hundred feet and up above them the giant plane soaring along.

Before I reached the head of the rapids the plane again passed overhead, headed back down-river. Arrangements had been made for the plane, after refueling, to return to Frontera and pick up a late-arriving member of our party, also a pilot, who happened to be an important member of the United States forestry department and was going to make an independent survey of the tropical timber.

I was kept busy supervising the loading of the canoes with gasoline and oil and getting them started upriver on their five-day journey to the ranch. Two days later, with all the supplies on the way and everything well in hand, I headed back to El Salto to

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await the arrival of the plane. Then we would install the aerial camera and photograph the river from the rapids to the timber tract, showing the transportation possibilities.

Halfway down the trail I met the rest of the party and the government forester. That wasn't according to Hoyle. They didn't have much to say but handed me a note, written on a piece of rough brown wrapping paper. It wasn't diplomatic, but it certainly was to the point. It was from the pilot. It read:

Dear Richardson,

You can take your photographic job and go to hell. The Kid and I are taking the first boat back to the States. You'll find the plane on the beach at Frontera. BILL.

The forester said the pilot hadn't even stopped the motor when he brought him upriver, but had shoved off at once, swearing he would never get out of sight of electric lights again.

There was nothing we could do about it. We pushed off upstream in canoes. It took us five days to reach the ranch and there we found the Indian boatmen with the stores of oil and gasoline.

We moved into the timber belt. For three months we worked at the job, measuring trees, taking levels, studying transportation and costs. We photo-

graphed everything in sight. Every day I cursed when I thought how much more simple it would have been had we been able to use a plane.

In our final reports, without exception we turned the project down because the cost of transportation was far in excess of the value of the timber.

With a map made from aerial photographs the answer would have been simple. The answers would have been there in black and white, where he could see for himself as though he were sitting in a reserved seat, high up. But on the other hand an aerial map might have shown some route that we had not discovered in our explorations on the ground, some way through which the timber could have been transported out at a reasonable cost.

That was a few years ago. The country hasn't changed. Supplies would still have to be transported in by pack animal and canoe. But a smaller, more efficient plane could be used, one that could land on the narrow stretch of river adjacent to the timber tract, and of course the pilot and cameraman should be men who knew their business.

By all of which I've tried to show that mapping with an airplane and camera is an easy job. Paradoxically it's also a hard job. Any way you look at it; it certainly sizes up as no job for an amateur.

AVIGATION

(Continued from page 35)



The Pierce chronograph comprises a tachometer, telemeter, stop watch and wrist watch.

the position it occurs or should be set down on a separate piece of paper and correctly labeled.

Besides keeping account of the time under way, the pilot should check his position against recognizable landmarks wherever possible along the route. Rivers, railroads, highways, mountain peaks, small towns, airway beacons all offer excellent reference points for this purpose. The pilot should, however, remember that they are to be employed as check points and not as a substitute for the compass unless the problem is purely one of *piloting*. Too often inexperienced flyers are given to distrusting the compass indications, or forgetting the compass altogether and following the course of some river or railroad which they erroneously believe to be the one they see marked on the chart. When this occurs the pilots usually end up by becoming completely lost, especially in cases where they have neglected to keep track of the time in addition.

Let us assume now that after one hour's run from William A. Burke airport the pilot (who has been faithfully following the compass course of 273°) finds himself directly over Oklahoma City. A glance at the chart will show that the plane has drifted some 7 miles in a south-southwesterly direction from point B, the position it should be at that time. This means that an incorrect value was allowed for wind when working out the initial problem, and that instead of the true wind's being expressed by the vector AR, it is properly expressed by AR plus RX or AX. In order for the pilot to determine the correct course to steer, which will keep the plane on the desired track, he must rework the problem, using AX as the wind value and 100 miles per hour, as before, for the airspeed. This new arc cuts the track at M, making the correct

heading, XM, equal to 282° true. Inasmuch as the variation near Oklahoma City is approximately 10° E, the deviation card must be entered with the value $282^\circ - 10^\circ = 272^\circ$ magnetic. There will be no change in the value of the deviation in so small a change in magnetic course; hence with the deviation at 4° west, the correct heading will become $272^\circ + 4^\circ = 276^\circ$. The ground speed for this new problem becomes $AM = 91\frac{1}{2}$ miles per hour.

It is important to note here that this new heading will not put the plane back on the original track but will cause it to continue parallel to it and some six miles below it. While six miles is not a great distance in airplane navigation, it will nevertheless be a good plan to get back to the intended track, so that the points passed over will coincide with the course laid down on the chart. This should be done by the most expeditious and convenient means, which, according to the landmarks in this vicinity, would be by following the CRI&P railroad across the small lakes in the vicinity of Bethany, through Yukon to El Reno, at which point the new course of 276° can be commenced.

Inasmuch as the distance between El Reno and Clinton airport is approximately 57 miles, and the newly computed ground speed is 91.5 miles per hour, this leg of the course should be covered in 37 minutes, provided the wind does not change again along the route.

The pilot should continue to check his positions relative to the time under way. For example at $91\frac{1}{2}$ miles per hour the plane should cross the Canadian River in the general vicinity of Bridgeport, approximately 12 minutes after leaving El Reno, and should pass Weatherford in about 15 minutes after crossing the river. If the plane's actual positions vary appreciably from those calculated, a check must immediately be started to find the cause.

Suppose now, that fog, as shown by the shaded area, is encountered shortly after leaving Weatherford. It will probably be necessary now to abandon the plan of proceeding on to Clinton, and



The Boyce-Meier sextant, an inexpensive but reliable instrument for the student.

an alternate refueling station must be selected.

The track between Weatherford and Hobart Airport is 212° true. Using the same wind value (from 346 T, force 26 MPH) swing an arc equal to an airspeed of 100 miles per hour, cutting the track extended as shown. The heading is found to be 223° true and the ground speed (the wind is helping the plane along now) approximately 116 miles per hour. The heading will, of course, have to be converted from true to compass, as before. The run between Weatherford and Hobart Airport should require

$$60 \times 42 = 22 \text{ minutes.}$$

The distance from Hobart Airport to Ponder Airport being only 24 miles and the weather to westward appearing clear, it will probably be best now to proceed on to Ponder before refueling, so that there will be a maximum amount of gasoline on board for the last portion of the trip to Amarillo. The flight between Hobart and Ponder can be made almost entirely a piloting problem if desired, by following the railroad through Lone Wolf and Granite. It is expedient, however, to lay out the track between the two points and to figure out, roughly at least, the proper course to steer, inasmuch as it is an easy matter to follow the wrong set of landmarks, as mentioned before, and become hopelessly lost when using the process of visual contact alone.

Upon landing at Ponder Airport the pilot should consult the altimeter to see if it registers 1585 feet, which is the altitude of the airport. If it does not, this means that the atmospheric conditions there deviate from the standard, and the altimeter should be reset to the correct reading.

While the ship is being refueled, the pilot should obtain all the information available as to the winds aloft, weather conditions along the route, field conditions at Amarillo and other aircraft likely to be encountered.

Suppose it is learned that the wind at 6000 feet over Ponder Airport is now 10 miles per hour from the north, and at the same altitude at Amarillo it is zero. There is no practical way of knowing in just what manner this wind force reduces along the course, so it is as good a measure as any to assume an average of the two readings to use as a wind value in laying out the new course. This will be north, force 5 miles per hour. Using this value to compute the course to Amarillo the heading is found to be 284° true = $284^\circ - 11^\circ$ E (variation) + 4° W (deviation) = 277° by compass. The ground speed is found to be 99 miles per hour. Inasmuch as the distance between Ponder Airport and English Airport at Amarillo, Texas, is 126 miles, the flight

between the two places should require 60

— $\times 126 = 1$ hour 16 minutes.

99


As Amarillo is approached, the ground elevations become much higher, and upon landing at English Airport the plane's altimeter should register approximately 3600 feet, a fact which illustrates the importance of remembering that the plane's altimeter does not necessarily indicate the height of the plane above the ground.

The flight that has just been described is what is known as a simple contact flight, employing both dead reckoning and piloting. A flight at night would have been conducted in virtually the same manner as far as navigation is concerned, except that airway beacons would have been available for checking position over certain portions of the route. Also the choice of refueling stations would have had to be altered because of the fact that most of the airports over this section provide servicing during daylight hours only and are not equipped with night landing facilities. The best plan in this case would have been to refuel at Oklahoma City, which airport not only has full night landing and servicing facilities but is equipped with radio and teletype, and would have had the latest weather and other pertinent information available regarding the route ahead.

Of course the pilot would have had to be familiar with the lighting system on the airways and airports in order to get efficient use out of them. To the experienced flyer, navigation at night is oftentimes a simpler matter than in the daytime, both because of the fact that lighted airways are usually available and because at night the lights of towns are distinguishable at far greater distances than the towns themselves are in the daytime.

The Federal government maintains a system of lighted airways made up of rotating beacons, and lighted intermediate landing fields. The rotating beacons are located at 10 to 15 miles intervals along the airways and are so constructed as to give six clear flashes per minute, with each clear flash followed by a red, green, or amber flash or else

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a red, green, or amber dot-dash code signal. When the former is the case the beacon is composed of a double-ended rotating searchlight, one end of which emits a clear beam and the opposite end a colored beam.

In the case where the clear beam is followed by a colored code signal, the beacon consists of a single or double-ended rotating searchlight which throws a clear beam over each leg of the airway six times a minute, and is aided by an auxiliary set of colored lights which flash a code signal along each leg of the airway immediately after each clear flash. The colored lights referred to are either red, to indicate that the area near which they are located is not landable, or green to indicate that they are located on a lighted landing field, or amber to indicate that they are located on an unlighted landing field. The code signal given by the colored lights denotes the number of the beacon on which they are located.

Intermediate landing fields are located at approximately 50-mile intervals along the airways; of course, wherever a regular airport occurs at a 50-mile interval, the intermediate landing field is omitted.

Beside the white and green flashing beacon, the intermediate landing field is marked with a border of white lights, 30 inches high, located at 300-foot intervals around the field. At each point of best approach to the landing strips, green lights replace two of these white border lights. All obstructions on and near the field are marked with red lights.

The Department of Commerce to date has not issued night flying charts except for a comparatively small portion of the United States; however, all of the information needed for a night flight can be obtained from the regular sectional day charts, and when the airway bulletin #2 (Descriptions of Airports and Landing Fields) is used in conjunction with them, the pilot should have no difficulty at all.

Next month, in the third and last of this series, the author takes up radio and weather in relation to aviation.

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AIR ADVENTURERS

(Continued from page 37)

We believe we have a well-rounded-out book; one that contains a full program of all aviation features. You may be a model-building enthusiast and have no truck with air fiction stories or details on aeronautical instruments. You may be a commercial aviation follower to whom a military machine is just another gas-burner, but there are readers who get much pleasure and much information from our adventure stories, and there are many who consider a study of military types far more important than all the model pages we can print. We try to please all as our contents page indicates, but we realize that there may be something lacking and we can only learn what it is by getting an outside viewpoint.

What we are really trying to say, of course, is that we feel we have a pretty



The Cambria, down for repairs last summer, was snapped by Douglas Val-leau, Toronto, Canada.

good magazine—but that we have no desire to rest on any laurels we may have gained, and wish only to improve.

Won't you, as Air Adventurers, help us?

A typical letter along the line of those in question comes from Gerald E. Pudney of College Park, Ga., who has just joined Air Adventurers. Pudney writes: "I like your magazine for I like aviation and I hope some day to join a flying club, but I also hope to become an airplane designer. I am a great collector of airplane pictures and I must congratulate you on your new enlarged photo section. These pictures are much better and much clearer for us who wish to study their construction and design. I am thinking of designing a high-wing cantilevered two-place all-metal light plane, and I was wondering if you can suggest a good correspondence school that offers a good course in aero-engineering."

Now you see, Pudney's letter is clear and to the point. He has a good angle on that enlarged picture section. Let's take up his problem of a correspondence course that teaches aero-engineering. In the first place we must remember that aero-engineering today is a four-year course at our best technical universities, and even then a man has only begun to scratch the surface of a very complex

subject. However, there are many great engineers today who are practically self-taught, or are the products of correspondence schools, and if a man has a fair grounding in mathematics and the desire to learn, he can go far on his own hook.

For years now I have been recommending Walter Hinton's correspondence course to our readers. I know Walter well and he is a square-shooter, and his school is respected everywhere in aviation. He does not make any wild statements in his advertising or promise to make a Donald Douglas out of you in three lessons. He is fair and if you will read his contract carefully, you will know just what you can get out of a good correspondence course.

F. Everingham of Toronto has sent us a set of miniature camera pictures taken at the Toronto Air Harbor (that's a new title!) which are particularly good. They show in real detail a number of Hawker Ospreys which had been catapulted from a British cruiser. Everingham has been reading Air Trails for more than two years.

Peter Kraus of Buffalo comes through with two swell shots of the Boeing Pea-Shooter (P-26A to you landlubbers) which seem to fill our bill to perfection. Peter has caught the idea we have been trying to put over for some time. We like unusual shots from unusual angles, and we think these, which we hope to publish, are among the most interesting yet received by this department. Peter's another "dream ship" nut, too, and wants us to take up the matter.

If you want to know how they go about it in England, listen to this from H. E. Williams of Frome, Somerset, and you'll get an idea why the R.A.F. seems to be such a cracker-jack outfit.

"For about two years now," Williams writes, "I have been studying to join the Royal Air Force and as you can imagine, I have been very busy. Still, I have managed to find time for Air Trails which continues to offer stories and articles as fine as ever."

You see, over there when they want to get into the R.A.F. they go to work and study for it and do not rely on some form of magic that will get them in without any effort. Grand stuff, Williams, we all hope you make it and get where you can tootle one of those new Hawker Hurricanes through the air.

Bill Weil, who sends us a nice letter thanking the gang for taking him into Air Adventurers, lives near the Army Barksdale Field and sees plenty of military air action. He has also sent in his Airplane Mechanic examination

paper. He has seen the National Air Races for the past two years. You sure get about a lot, Bill.

You can't stop these Canadians when they get an idea. Here's James Gunn of Toronto, just signed up for Air Adventurers, who as suddenly pops out with the announcement that he is certain he has solved the problem of cooling a multi-row radial engine. At any rate, he thinks he is on the right track and wonders if any of our members are interested in this subject; if so, get in touch with him at 200 Golfview Avenue, Toronto. We hope you get a lot of answers Jimmy, and don't forget Air Adventurers when the profits begin to roll in from your invention. And by the way, Jimmy, we want you to get us some information on that Toronto Flying Club you mentioned.

Here's a pip! Some time ago we mentioned a Kay Goff, a member of this outfit, and we naturally assumed that Kay was a young lady. Kay came back at us though with a letter from California telling us he's a boy! Well, there it is, you members; Kay Goff's a boy and don't forget it. He says people often get confused, but we hope he doesn't change it 'cause we think it's a swell name just the same. Kay has been to March Field and has promised us some good pictures of the Army planes he saw there. He actually went into the front gun-turret of a Douglas B-18 and took some pictures.

Well, we're waiting, Kay.

Listen to this! Don Rice, of Huntington, West Virginia, has a motor-scooter and he uses it to ride out to the airport nearby where he takes quite a number of pictures. A short time ago, he deserted his scooter and had his first airplane ride in a Waco and sends us an unusual picture taken out of the cockpit window showing their new concrete runway coming up at them. It's a pippin, too.

Many thanks to D. Winterich of North Bergen, N. J., for a number of pictures taken at Newark Airport and North Beach Airport. He says he has about 200 pictures of the most modern craft in his file. He has sent in his membership coupon, too, so we have bagged another photographer.

We are getting plenty of returns on pictures again, but we would like to get more on observation and topography subjects. We haven't had many good detail maps or scale drawings of airports lately, and we're all set for something hot.

So get busy, fellows, and see what you can do. We want as much variety as possible, we want to develop every phase of this department.

Robert F. Clark of Indianapolis was recently a passenger in the Goodyear blimp *Enterprise* on a flight over Wash-

ington. He took two rolls of film while in the air and has sent us a print of the business section of the capital which was very interesting, but unfortunately not clear enough for reproduction.

Bill Beck of Greenville, Pa., is one of the liveliest of live wires. He sends us a letter telling how he and a few other fellows of his age decided to do something about aviation in northeastern Pennsylvania. They procured a field and built a hangar on their own. Today they accommodate three Cubs, one Taylorcraft, one Monocoupe and a Waco cabin plane. Recently they staged a model plane contest and twenty-four members turned up and created quite a sensation and brought in quite a crowd with their exhibitions. Bill is going to see that more of these contests will be staged and he makes it final by sending in his application for membership in Air Adventurers.

Come in, Bill!

Stewart Thompson of Oxford, N. S., is a swell example of what Air Adventurers can do for a fellow. He has been interested in aviation for some time and is a regular reader of Air Trails. He took up Walter Hinton's Aviation Course and then sent in his name as an applicant for the Royal Canadian Air Force. What do you think happened? They accepted him and while he is waiting for his call, he is making models from Air Trails magazine. He's working on the Gulflark, which appeared in our December issue.

That ought to start the coupons from up there in Nova Scotia.

Bill Burns of King's Mills, Ohio, is collecting aviation articles and says he gets plenty from Air Trails. He's going to Ohio State next year in preparation for a career in the Army Air Corps. He sends us a picture of a plane and wants to know what it is. Well, Bill, it's a German Junkers F-13.

Chester Wrobel of Chicago has captured his photographer's award with a swell picture of Wiley Post's *Winnie Mae* which he took in a hangar at the Curtiss-Reynolds Airport in 1936. The picture is good, considering the condition under which it was taken, but it is not quite sharp enough for magazine reproduction.

We have another interesting letter from one of our girl members. This time it is Miss Pauline Mudge of Edinboro, Pa., who has her troubles breaking into aviation, and wants to know what we think she can do about it.

"I find myself worse off than Miss Brunner whom you mentioned in the club news some time ago," Miss Mudge writes. "I am a small-town girl and I'm afraid there isn't much chance for me in aviation. I find it very hard here in Edinboro to get any first-hand experience in this wide and wonderful field. I have taken every opportunity which

has come my way and one of the opportunities is the information and help I get from reading Air Trails. I depend on it each month for my source of knowledge along with the books and other material I can get my hands on. I, like many other Air Adventurers, am adding to an already large collection of pictures, clippings and news. I have divided it all into numerous divisions which I expect to be of some service in the future.

"Perhaps, in the meantime you could help me out by adding some more information on the places a girl can fill in the field of commercial aviation."

Well, you see Miss Mudge is no idle dreamer. She knows what she wants and she is willing to work for it. I can see that she has a rare degree of intelligence and suggest that she try to contact the publicity offices of the various airline companies and try to get connected in such a way as to best use these writing talents of hers. She could of course try for a hostess job, if she is willing to first take up nursing. All hostesses, you know, are trained nurses. There are often openings in the traffic departments for competent women.

We have also gathered in another British member. He is J. C. F. Leachman of Upton Park, London, who is a member of a light-plane club, a motorcycle fan and a crack rifle shot. In addition he does a little model making and at present his score is exactly one hundred models, all on exhibition in his home. There's a new way of scoring a century. He has sent in his coupon and we have been more than pleased to send Leachman his pin. He has also promised to send this department a stack of photographs of the latest British planes, and you bet we will be looking for them.

Dr. William H. Robey of Sullivan, Mo., is back again with a new qualification. So far he has passed five of our toughest examinations and now comes through with his Flight Captaincy paper which has been passed as excellent.

We get criticism, too, now and again, but we ask for it. Constans G. Curtin says that the heading at the top of this department is out of date. What do you think of that? Well, he can go ahead and try us on a new idea. He's quite an artist, you see, for he included his impression of a Ryan S-C job in full flight, and it is pretty good. He says too, that our short articles should be continued, and a department for "dream ships" with fewer restrictions, such as "strictness for scale." Well, it takes all kinds to read a magazine, and that's a new one on us.

Which is all we have room for this month, but stay with us and keep us posted on what the boys and girls are doing. If it's interesting we'll do our best to run it, but we want more and better pictures, drawings and plans.

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MODEL MATTERS

(Continued from page 65)

mental field of the U. S. Army. Every ship purchased by the Army is tested there. Since before the war it has held a key position in making air history.

Jacksonville Club

The Jacksonville Model Club elected the following officers at their meeting held recently: President, Milton W. Myers; vice-president, Theodore Everett; secretary, Lawrence Ruley; treasurer and adviser, William L. Timpone.

The club holds a National Aeronautic Association Charter and its contests are conducted under the official rules. Two of the J. M. C. members hold N. A. A. records for hand-launched gliders, class C and D. Spring and summer schedule of club activities includes the club anniversary held in April (3rd annual contest); Florida state contest scheduled for some time in June; and participation of J. M. C. members in All-Southern Meet in Louisiana.

Blair Academy Club

Blair Academy, Blairstown, New Jersey, is the only college preparatory school having an active gas model club. It was organized last fall. Flying is done every week-end at the Martins Creek Airport, near Easton, Pa. Arrangements have been completed for an invitation meet to be held this spring—May 21st. \$100 in model material will be given to the winners of the four events. All modelers are invited to participate. Officers of the club are: LeRoy Weber, Jr., president; Jay C. Miller, vice-president; and Philip Saitta, secretary-treasurer.

Junior Aviation League

Junior Aviation League, Boston, Mass. Ralph Brown is the sixth League member to win the rating of "Ace." In addition he holds the official N. A. A. record for helicopters at 2:15. This is a junior record since Brown made the flight a few weeks before he became 16—the dividing line between junior and senior divisions. In addition he holds the junior record for indoor R. O. G. stick models set at the national meet in 1937. Ralph is an all-around builder who can give a good account of himself in any event.

Boston was well represented at the recent Model Conference in Washington. Academy president Al Lewis, together with Bruno Marchi and Torrey Capo, made the trip to the Capital.

Work on the League's model wind tunnel, being built by members, is nearing completion. The 5-foot-diameter test section will make possible complete tests on full-size rubber and gas models. Tests will be conducted at

velocities ranging from a few feet per second for indoor models to 20 m.p.h. for outdoor jobs. Information coming from these experiments should fill the gaps in existing model aerodynamic theory, since it will provide accurate data on low-speed models.

Bruno Marchi has been doing excellent work in his Saturday morning classes for beginners. Under his expert guidance, beginners have turned in top-notch flights with their first models. This idea seems to be the best way of spreading the doctrine of modeling—a little expert advice directed to the trouble spots will do wonders in converting a skeptical tyro into an enthusiastic builder.

South Jersey Gas Club

All modelers in southern Jersey and nearby states are invited to join the South Jersey Gas Model Airplane Association. There are no dues and the only fee is the membership in the N. A. A. Gas Model Division. It is interesting to note that the club was organized from a rubber-power model club of nearly nine years standing.

Prospective members who have not yet built a gas model are urged to attend club meetings and take advantage of the information and experience accumulated by club members. The club has been doing much original design work such as mercury ignition switches, which cut the motor should the model reach a dangerous altitude; automatic wing flaps for high-speed models; and novel endurance attachments. Another club advantage is a suitable enclosed trailer used to transport members' models.

Anyone interested in joining the S. J. G. M. A. A. or in "talking shop" with experienced modelers is invited to contact the club president, Frank Hernandez, Jr., 208 Edgewood Ave., Audubon, N. J.

New Contest Rules

Many important changes in regard to rules were decided on at the First National Model Aircraft Conference held in Washington, D. C., on March 12th and 13th. A representative group of modelers attended from all parts of the East. Those unable to attend conveyed their ideas through questionnaires. The answers were tabulated to obtain a country-wide cross-section of opinions.

The Academy of Model Aeronautics is charged with the task of advising the Committee on Rules on any changes deemed necessary for the welfare of the hobby. Meetings of the Academy were held prior to the conference. Their conclusions were then passed on to the conference at the Saturday afternoon meeting.

President Al Lewis of Boston presided

at the Academy meetings held Friday afternoon and Saturday morning at the Lafayette Hotel. Participation in these meetings was limited to Academy members. Members taking part included Bruno Marchi, Ed Roberts, H. M. Jellison, Irwin Polk, Lawrence Smithline, Jesse Bieberman, Victor Fritz, Charles Grant, Robert Sommers, Robert Allen, Gordon Light, and other Academy boosters.

Saturday noon, the New York World Fair was host to the conference at a luncheon in the Hotel Lafayette. It was announced that the World Fair was sponsoring the 1939 national and international meet. 1939 promises to be the most outstanding year in the history of the hobby. A complete schedule of events and rules will soon be released—thus giving the modeler more than a year to prepare for the contest.

Robert Sommers, of the Stix, Baer, and Fuller Club of St. Louis, presided at the meeting Saturday afternoon. Changes in the rules recommended by the Academy were thrown open to discussion. Anyone interested in modeling was invited to contribute to the discussion. Following are the important changes which were finally approved:

The cross-sectional area of a stick model fuselage must not exceed $\frac{L^2}{200}$,

where L is the fuselage length. Thus fuselage models will no longer be eligible for the stick model contest by merely removing the landing gear.

The Moffett elimination contest has been discarded. The first six contestants in the Stout fuselage contest automatically become the representatives for the Moffett finals. This change was recommended to relieve the pressure resulting from too many different events at the national meet.

Judges and timers will remain at the spot of launching and will not be permitted to follow the model. They will time the model just as long as they can see it without the help of binoculars. This change will speed up contest procedure and will prove fairer to all contestants. This applies to both rubber and gas models.

Gas model events will all be run on the basis of a 30-second motor run. Mechanical timers or careful fuel allotment will be necessary on the part of the timer to confine his motor run to this length of time.

After considerable discussion the conference finally agreed to approach the Bureau of Air Commerce with the suggestion that gas modelers under 16 years be permitted to fly their models when accompanied by a certified modeler over 16 appointed by the club adviser. It was agreed to retain the old ruling which requires the modeler to be at least 16 before he is eligible

for the N. A. A. gas model license and competition in the National Meet.

The conference agreed on a minimum wing loading for gas as 10 ounces per square foot of area with a maximum weight of 7 pounds. Considerable controversy followed the adoption of this ruling. It was pointed out that a ruling of 8 ounces per square foot would permit many existing models to enter contests that would be excluded by the higher weight requirements. And too,

the 10-ounce minimum would not be any more effective in preventing long, soaring flights.

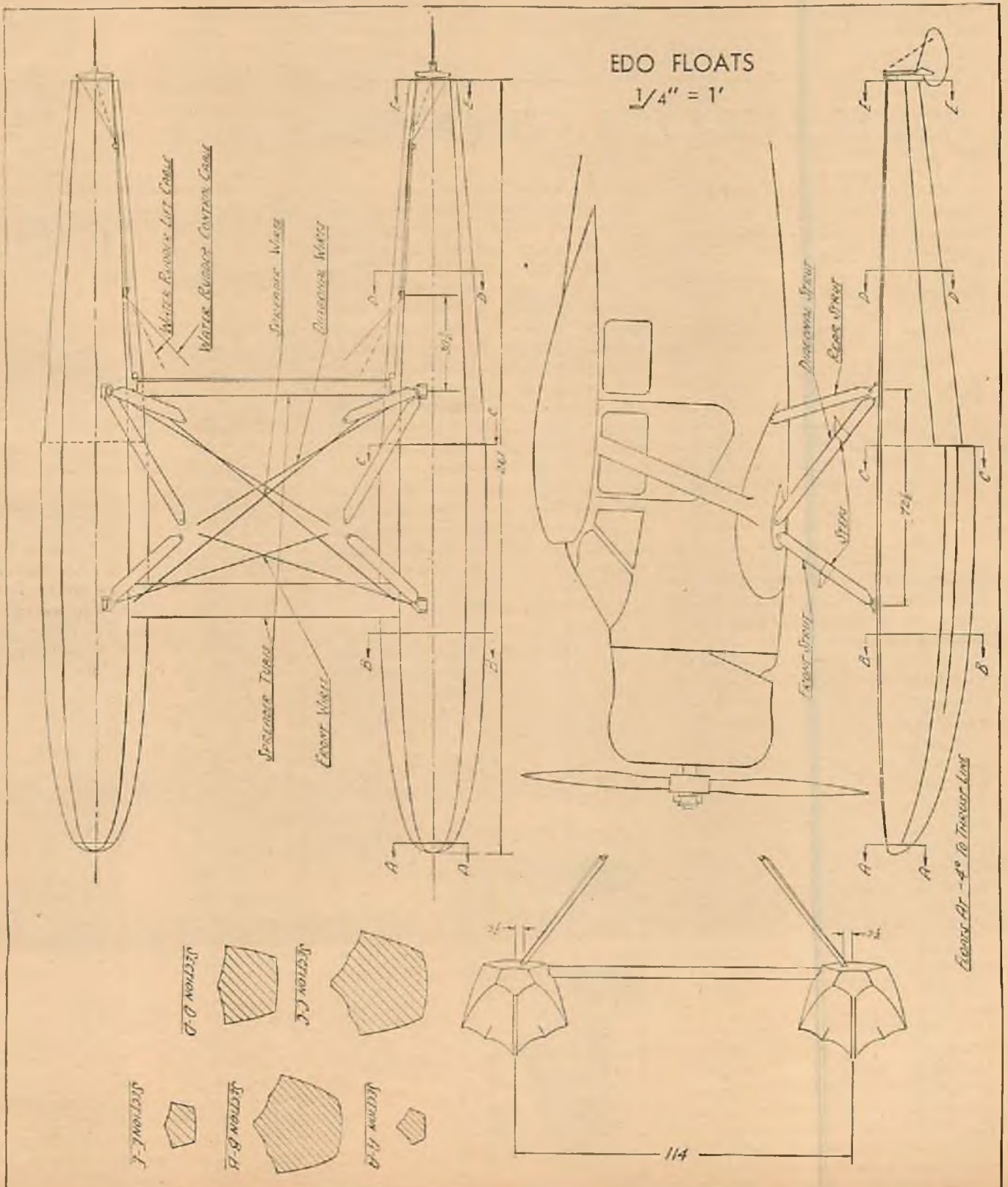
Contestants at all meets will be permitted to buy their models in kit form with finished ribs, spars, etc. However, all lifting surfaces and fuselage must be assembled by the entrant. In addition, the contestant must carve his own propeller for a rubber-powered model. Radio-controlled gas models will be limited to 25 pounds maximum weight.

About Pete Dillon

Pete Dillon, duPont Trophy Holder, has been doing some thorough test-flying of his new model—Mr. X. Readers will recall that plans for Dillon's trophy-winning model of 1937—Corben Super-Ace—appeared recently. Dillon lives in Jackson, Michigan, where winter temperatures are low. However, gas-model flying goes ahead while the

EDO FLOATS

$\frac{1}{4}'' = 1'$



thermometer shows temperatures as low as 15 degrees. Ray Miller, another Jackson modeler, lost his Bunch-powered Curtis Robin on just such a day. It disappeared in a 2000-foot ceiling despite the efforts of an Aeronca and a Taylor Cub to keep it in sight.

Dillon's Mr. X is an interesting design with an inverted motor for a better streamlined cowl. The batteries are mounted vertically in the cabin using a battery case with clips. A test-tube gas tank is used instead of the conventional type. The motor mount slides out on skids and Dillon carries a spare—to insure uninterrupted contest performance

regardless of any trouble. The model was designed especially for the 30-second limited-motor-run event. Dillon is banking on Mr. X to keep him on top in the duPont event.

Illinois Notes

Members of the Illinois Model Aero Club are priming for the spring and summer contests. The destinies of the club are in the capable hands of Harry Dolfi, president; Walter March, secretary, and Bob Kaergard, treasurer. Club directors are the veteran model builders Walter L. Brock, Eugene Docherty, and Robert Jaros. Club meet-

ings are held the first and third Fridays of each month. Anyone interested in modeling is invited to attend—Room 132, The Auditorium Hotel, 430 South Michigan Blvd., Chicago, Ill.

Modelers in Glen Ellyn, Illinois, have started an Aero Club. Routine organizing procedure has been completed and the first club contest was scheduled for February 27. Edward Weber is president and William Fleming, vice-president. Modelers in this vicinity are invited to contact the Aero Club through William Fleming at 844 Pennsylvania Ave., Glen Ellyn, Illinois.

SUPER SPEED FOR GERMANY

(Continued from page 70)

previously applied wood filler or dope, the outside of the fuselage will be found to be quite strong, so it may be hollowed out very thin behind the wing. Tools described by Mr. Booton in previous issues of Air Trails have been found to be the best for hollowing, so no mention will be made as to the type of tools needed. Before cementing the two halves of the fuselage together, cut the openings for the spar, leading, and trailing edges into the wing stub. The rear hook may be cemented in place at this time. A coat of wood-filler followed with sanding will hide the crack left between the two blocks after they have been cemented together.

WING CONSTRUCTION

The simplest way of making the wing is to make it in four parts, namely the two outer panels and the two center panels, which are cemented to the wing stub. To obtain the inverted "gull" appearance, do not forget to include a slight slant on the end ribs of each panel. Build the center portions of the wing first and attach to the wing stub. The leading edge of the wing is cut from sheet balsa, three pieces cemented together serving as a whole leading edge. It will be noted that the portion of the wing that the landing gear is connected to consists of two ribs cemented together, affording extreme strength, which is needed in a fast model such as this. The pieces "F," "G," and "H" also reinforce the wing, but are not necessary if the model is not built for flying.

LANDING GEAR

The landing gear is quite simple when started the right way. The bent wire piece "N" that is cemented to the two laminated ribs "1A" and "1C" absorbs the landing shocks, and the two small lengths of tubing let the landing gear swing outward and upward if a retracting landing gear is desired. Of course,

a much simpler landing gear can be made out of plain wire struts if the model is for flying purposes and scale purposes are secondary. In a non-retracting type, the strut "K" is cemented in solidly, but in a retracting type it should be removable to allow the landing gear to swing upward into the wheel wells. The flap "L" completes the covering of the landing gear when retracted. The bottom of the wing is covered with $\frac{3}{32}$ " sheet for strength, and is utilized if the retractable type of landing gear is used. In the latter case, the wheel well is cut into the balsa, and when the landing gear has been swung into place, the bottom of the wing assumes a flat shape, unobstructed by any portion of the wheel or struts.

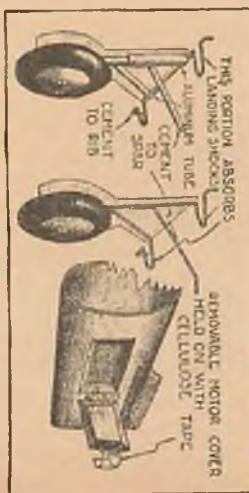
TAIL SURFACES

The tail surfaces can be constructed at this point, and a groove is cut in the rear of the fuselage to accommodate them. Proceed with caution when cutting the groove, since a slight difference in angles will cause the model to dive or stall. All the outlines and strips in the stabilizer and rudder are $\frac{1}{16}$ " thick, and the only precaution to take when

making the tail is to avoid warping. The wing and tail surfaces are covered with tissue and evenly sprayed. While the tissue is drying, details may be added to the model. The exhaust stacks may be cut into the sides of the fuselage, and the small hole representing the shell ejector should be cut out directly behind it. The machine-gun trough is carefully carved in next, and then thin lines are scribed into the balsa with a sharp pencil to represent the different sheet metal motor covers. A small platform is cemented across the cockpit to support the headrest, and then small aluminum strips should be cemented in place to provide a foundation for the celluloid cockpit covering, which is applied next.

The whole model is now given a coat of clear dope and sanded lightly. This is followed by two coats of gray dope. Wood filler waterproofs after the second coat, so the emery cloth or sandpaper being used can be moistened. The water is helpful while sanding because it keeps the wood filler from "filling up" the sandpaper. It has been found that Carborundum 520 wet or dry paper is best for rubbing away the excess wood filler. After this operation the model may be doped in the usual way. For finishing, always use a dope of good quality, and make sure that it is thin enough not to leave brush marks on the surface being painted. Black letters cut from tissue may be applied now, and the rudder insignia added. A red band is doped around the rudder, and while it is drying, a circle is cut from white paper. A swastika is drawn on it in India ink, and the circle applied to the center of the red band around the rudder.

Details of retractable landing gear and hinged opening for rear rubber hook.



The author's model weighed one and three-quarter ounces, ready to fly, but this included a quarter of an ounce of clay in the nose, since the original model was tail-heavy. Six strands of $\frac{1}{8}$ " flat rubber were used, due mainly to the weight, which made the model very fast. A helpful hint to modelers who make a heavy model is to put a lot of under-camber in the propeller.

AIR PROGRESS

(Continued from page 6)

estimated cruising speed of 220 m.p.h. and a range of 2,125 miles. Three Supermarine Stranraer flying boats have been ordered by the Canadian Department of National Defense.

Imperial Airways will continue their transatlantic survey flights this summer using an improved type of flying boat. The route will be run between Ireland and Newfoundland and special attention will be paid to a new technique of refueling in the air after the take-off.

Of the world's aggregate total of air-route miles, believed to be about 305,200, the British Empire ranks first with a total of 68,240 miles.

Plans are now under way and are nearly completed for the purchase of the Eastern Air Lines from the North American Aviation, Inc., for a sum of \$3,500,000. Captain Eddie Rickenbacker heads the group which is to purchase the holdings. Rickenbacker will no doubt remain as president of the air line, but will relinquish his post of vice-president and director of North American Aviation.

Reports have it that the Lockheed Aircraft Corporation of Burbank, California, is considering the building of a 100-passenger airplane in response to the Pan-American request for such a craft. Hall L. Hibbard, chief engineer and vice-president of the concern, already has a design on the board, and it is believed he is working on a 200,000-pound ship built along the lines of the "flying-wing."

In response to the Army's 100-plane contract offer for a freight ship, the Lockheed firm plans a modified Model 14 in which all ten seats will be removed and to which will be added a 6-inch "blister" in the cabin roof to accommodate the carrying of three of the Air Corps' largest aero engines which weigh about half a ton each. Already, this ship has been dubbed the Flying Dromedary.

United Airlines recently celebrated the fact that over a period of thirty days no stewardess had resigned to get married. It was the first time in two years that a month had passed without at least one of the girls capitulating to Cupid. During 1937 no less than 57 stewardesses were lost to the line in that manner.

AIR FORCES

Reports from France indicate that the French government is negotiating with American firms for the purchase of 300 military planes to make up for the lag in French production. No details on the types involved or the companies considered were available.

The British Royal Air Force, after lengthy tests covering a period of about

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two years, has decided to replace much of the machine-gun equipment on British military planes. It is believed that the new Vickers-Berthier will become the light flexible gun and the American Browning the fixed heavy weapon. Already plans have been made for the production of the American weapon in British factories.

The new Supermarine Spitfire interceptor-fighter is now in production for British fighter squadrons. The plane has a top speed of more than 300 m.p.h. and a special scooped-up version is being prepared for an attack on the world's land-plane speed record.

Many Americans will learn with regret that "Wop" May, war-time squadron pal of Roy Brown, who is credited with the defeat of Baron Manfred von Richthofen, has lost the sight of one eye as the result of a serious operation. For years May has been actively connected with Canadian air transportation.

The Brazilian Air Force has acquired the three Savoia-Marchetti bombers which recently flew the South Atlantic. Premier Mussolini made Brazil a present of the ship piloted by his son.

The outstanding event of February was the "good-will" flight of five U. S. Army Corps Boeing YB-17's from Miami to Lima, Peru, in less than 16 hours. They flew the 2,500 miles from Lima to Buenos Aires in 12½ hours.

The annual tactical efficiency award for 1936-37 has been given to the 26th Attack Squadron, which is attached to the 18th Pursuit Group and stationed at Wheeler Field, Schofield Barracks, T. H. The award is based on neatness of barracks and area, appearance of personnel, efficiency of tactical missions, maintenance of aircraft and the completion of training directive.

The 19th Pursuit Squadron at Wheeler Field, T. H., recently took over a new flying boat of the S-43 type. It is affectionately known as the "Rabbi" by the pilots of the outfit. It will be used for off-shore patrols and accom-

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SURE.

panying the P-26s and new attack ships on over-water missions.

The 23rd Bombardment Squadron stationed at Luke Field has been devoting much of its time to bombing missions. With exclusive use of the new floating target of the 5th Composite Group, this squadron has been able to carry on quite a lot of intensive bombing training.

The 27th Pursuit Squadron of Selfridge Field, Mich., recently completed an arduous air trek which carried them a distance of 4,600 miles and across fifteen States. With two exceptions the P-26's stood up well under the heavy grind. A clogged strainer forced Lieutenant Julian M. Bleyer down at Valparaiso on the fourth day, but both pilot and plane landed without damage.

Lieutenant James L. Bledsoe was forced to abandon his ship about 30 miles west of San Antonio when the engine suddenly failed.

Great Britain plans to have an air force of at least 10,000 planes within a year. A sum of \$513,600,000 has been set aside to complete the secret air defense plans. In the past year 4,500 pilots and 40,000 aviation mechanics have joined the service.

The new German Heinkel fighter is powered with a Junkers Jumo oil-burn-

ing engine, and is armed with two aircraft cannon set inside the wings and two fixed machine guns under the engine cowling.

Britain is "enjoying" a spy scare similar to that recently disclosed in the United States. Already one "mystery bomber" has been lost somewhere in the Cheviot Hills with a crew of three. All efforts to locate the plane have failed to turn up any trace of it, and the newspapers in London are playing up the possibility that it may have been flown across the North Sea.

The Canadian government has voted a sum of \$10,753,617 for the air defense needs of 1938-39. With this money 75 new planes will be purchased, five air bases will be set up along the Pacific Coast.

Experiments are being carried out at Langley Field with the launching of heavy airplanes under service conditions by catapult.

U. S. Navy lighter-than-air craft will be painted blue in the future to aid in camouflaging them in action.

MISCELLANEOUS

Amy Johnson, noted British girl flyer, is taking up gliding and recently ordered an H-17 glider.

A German pharmaceutical firm is now

prepared to send at any time to any point in the country a privately owned airplane bearing serums and trained personnel to meet epidemics or other emergencies.

J. C. Franklin, T. W. A. superintendent of communications, has been awarded the Air Board safety award for 1937. Franklin perfected the directional radio antenna for the guidance of storm-tossed airmen.

A record for "high landings" was established recently in Peru when Commander Manuel Escalante, chief of the aviation squadron at Iquitos, was forced down on the surface of a lake at an elevation of 15,000 feet, high in the Sierras of Central Peru. Owing to the rarified atmosphere at this altitude, it was impossible to take off again from the surface of the lake, and the ship had to be dismantled.

The Army Air Corps is still seeking candidates for Flight Cadet appointments. On March 9th there were still openings for 112 men who have had at least two years of college and who can pass the physical examination.

In spite of past experiences with large lighter-than-air ships, the House Naval Affairs Committee recently allocated a sum of \$3,000,000 for a new dirigible.

THE RISER RIDER

(Continued from page 59)

motor run, if you know your model and can keep it flying in just the right circle. If you are in doubt as to the size of motor you are going to use, cut skid for largest motor. Later you can make a reduction plate of light steel with holes to fit both motors and a cut-out to fit the smaller.

As most of the tanks furnished will not work efficiently with $\frac{1}{4}$ ounce or less, make a small gas tank holding about $\frac{3}{8}$ ounce of gas from sheet metal. If a Cyclone is used, the tank must be mounted on a block so that the bottom is about $\frac{3}{8}$ " above the motor skid. In the writer's opinion suction-feed motors (Brown, etc.) are more efficient than the gravity-feed kind. Mount tank on the skid and when motor is put in, connect the bottom of the tank to the motor with rubber tubing.

Use $\frac{1}{2}$ " fine screws for attaching brackets to fire wall. No screws are needed to fasten bracket to skid as motor screws go through both. Cut cross-pieces and assemble body sides, putting in nose assembly last. Top cross-pieces at rear are not to stay in, but put them in first in order to line up the assembly. Put short pins in all joints and apply an extra coat of thin glue all around. Cover sides with $\frac{1}{8}$ " sheet, gluing to all members. Trace

M6 template on both sides of fuselage at rear, putting reference line of the airfoil right on the thrust line. Cut away covering and frame so that elevator can be slid into place. Glue firmly. Cover bottom of body with sheet balsa. Glue in $1\frac{1}{4} \times 16$ " battery track. Put in wiring according to Plate 1.

Solder all connections carefully. Switch plug-ins are mounted on a thin panel of hard wood. (Our plug-ins were taken from an old radio tube socket). Wires passing over motor skid are glued down. Cover condenser wires with glue. A Burgess battery was used on this model, but regulation battery box and flashlight batteries may be used. Sew and glue wing hooks on side of body. Cover the top of the body except where wing goes on. Sand smooth. Make rudder top and bottom using $\frac{1}{4} \times 1$ " balsa outline all around. Use solid $\frac{3}{32}$ " ribs of streamline shape and cover shaded portion with $\frac{1}{16}$ " sheet. Cover with silk and glue to the body. Set at zero degree angle. Fillet all tail connections with plastic balsa (balsa sawdust mixed with glue or thick dope). Mold with fingers. When dry, sand and cover with strips of silk. Cover whole body with silk.

Bend landing gear from $\frac{1}{8}$ " steel wire. Bend a 23" strip so that it has a

4" center, 8" struts and $1\frac{1}{2}$ " axles. Bend a rear piece with 4" center and 12" struts. Wrap rear to front at axles with fine copper wire and solder. Sew landing gear to fuselage with heavy thread and flood with glue. Dope body with three or four coats. The Riser Rider was finally doped yellow.

Screw motor on skid, attach wires and gas line. The model will be improved with a cowling cut from a balsa block as suggested on plans, and with a fillet of plastic balsa fitting up under the wing. However, the model will turn in real performances without them.

Pick a quiet day to test model. It should balance at middle of wing. Move batteries to adjust. First try gliding. Face model on runway into the wind and give a gentle push. Increase power of the shove until the model takes off, climbs to three or four feet and comes to a gentle landing. Next try hand-launching a half-dozen times or so. If the model banks, block up at center for temporary adjustment. For first powered flight, have motor run only a few seconds. Never put in more than $\frac{1}{8}$ ounce except at contests. Never put in more than 30 seconds of gas unless you have a car all ready to go.

(Note: Weighing $3\frac{1}{2}$ pounds, the model has a wing loading of 9 ounces per square foot. For new weight rules use very hard balsa or slightly larger sizes to raise weight 6 ounces. Wing area is approximately 6.2 square feet).



Stanley W. Smith

Our Silver "C" guest pilot this month is Stanley W. Smith, long active in gliding circles, and he reports as follows:

"My gliding training was begun in the fall of 1930 in the University of Michigan Gliding Club. For the following three years I was an instructor in the club and was elected its president in 1933-34, my senior year. The summer of 1932 saw me as an entrant in my first National competition after having been an enthusiastic spectator the previous year. I made the first leg on my Silver "C" on my second soaring flight when I was aloft for 8 hours and 10 minutes at the same time that Jack O'Meara was doing his 8 hours and 18 minutes in the Chanute sailplane. I was flying the Franklin utility in which I had learned to fly. At the end of the contest I was declared the Outstanding Junior Pilot for the 1932 meet.

"In the 1933 Contest, after winning two firsts and one second place in the three major events, I was awarded the National Soaring Championship. My ship was again the Franklin utility. In the 1934 Contest I was able to qualify for the second leg of the Silver "C" with an altitude flight of over 3400 feet in a Franklin. It was my pleasure to

turn the Evans Trophy over to Dick duPont, who had established a world's distance record in his Albatross sailplane.

"In August, 1934, I flew with Jack O'Meara and R. E. Franklin on the Lustig Sky Train flights from New York to Washington and return. In January, 1935, I went to Wilmington, Delaware, with Bowlus-duPont Sailplane, Inc., and worked with N. Heath McDowell on the design and construction of the duPont utility which Hank Wightman flew to Middletown from Elmira in 1936, probably the longest flight ever made in a utility type ship.

"In the 1935 Contest I was able to win first place in distance for utility gliders with the usual Franklin. After putting on a number of aerobatic exhibitions at Rochester and LeRoy during the following summer and fall, I took a Cadet II utility to the Shenandoah Soaring Contest at Big Meadows, Virginia, in October and although weather conditions were too poor for any good soaring flights, was awarded the Luray Post Trophy as champion of the meet.

"During the 1936 competition I was finally able to complete the requirements for the Silver "C" with a distance flight of 35 miles in a Rhon-Bussard sailplane, reaching at one time an altitude of 5460 feet. This was my first flight in that particular ship and also my first opportunity to fly a sailplane in any contest.

"Shortly before the 1936 Contest I was employed by the New York State Aviation Schools to do some design work for them. However, I was shortly sent to Elmira as Director of the Aviation School there and then, in February of 1937, was transferred to Utica, where I immediately began the design and construction of a side-by-side utility glider. Following its completion in June I airplane-towed it to Elmira for the 1937 Contest and, arriving several days late, sat on the ground until the end of the meet waiting for an opportunity to do some soaring in it. I have since been able to soar the ship for over an hour with evidence of very satisfactory performance.

"I am now engaged in the design of an airplane which will be constructed at the New York State Aviation School, where I am Supervising Director.

"I have been a Director of the Soaring Society of America for the past two years."

CRASH! A sensational article by Lee Gehlbach in the July issue of Air Trails. The inside story of airplane racing revealed by a pilot who has distinguished himself by his participation in the Bendix and Thompson events and by his colorful career as a test pilot.

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WORLD'S RECORD GLIDER

(Continued from page 68)

to determine the gliding angle. Through the kind and accurate assistance of Mr. Roul Hoffman, a well-known aeronautical engineer, the record-holding glider was found to have a gliding angle of 13 to 1. In other words, for every foot of altitude lost the model flew thirteen feet forward. Now when you consider the fact that a glider is the highest developed model used solely for gliding you can easily see how utterly fantastic it is for some model enthusiast to say he has a model with a 20 to 1 gliding angle, especially when that model is hindered with propeller and landing gear.

When choosing the wood for this highly developed type of glider, extreme caution must be exercised to obtain the kind which has the weight and other properties necessary to yield the best results. The wood should weigh about 5.5 pounds per cubic foot. Lighter wood will not be strong enough, and heavier wood will only increase the wing loading. The preferred type of wood is known as semi C stock or semi-quarter-grained. It has been found best for all-around glider construction and may be identified by its speckled or flaky appearance. Pure quarter-grained wood is very stiff and will not warp, though it is of advantage sometimes to slightly warp the surfaces of a glider to obtain fine adjustments, and full quarter-grained wood will split when this is done. When semi-quarter-grained wood is used it will be found after shaping the wing that the leading edge is pure quarter-grained, tapering out to a more flexible grained wood at the trailing edge. This type of cut retains the anti-warp properties, yet when intentionally bent it will not split. Care must also be taken to obtain wood of constant weight and texture throughout.

Most model builders have their own pet surface to work upon, but precautions must be taken to see that no ridges or nicks get into the wood through bumpy or littered-up work

benches. We have found old magazines provide a soft, flat and smooth working surface. The pages can be torn off and discarded when they begin to get fuzzy or accumulate wads of cement.

After the outline of the wing has been cut from the chosen sheet of wood, a small block plane will prove handy in roughly shaping out the airfoil. Then the section is carefully worked in, starting with coarse sandpaper and working down to #10-0. If the sandpaper is wrapped about a soft balsa block the danger of the sandpaper creasing and making ridges in the wood will be minimized. Frequent use of ruler and calipers will assist in getting both panels identical. After all sanding is completed, rub the wood vigorously with the back of the #10-0 sandpaper to press all fuzz and sanding dust into the pores of the wood.

The finish on a glider is of prime importance, not so much for the decrease in skin friction, which does help considerably, but for the increased strength obtained, and the greater accuracy of airfoil section. The finish unites the cells of the wood and forms a thin skin over the wood. This skin stressing helps enormously in keeping the wings from being "thrown off." When a good smooth finish is obtained the airfoil section is more accurate and a better L/D ratio is obtained, which boosts the gliding angle.

A good grade of glider polish should be used. In case you do not prepare your own favorite solution any popular brand will suffice. Do not use unplasticized dope of any kind, because it will work the wood badly.

A coat of wood filler, which is also plasticized, that is, made flexible, should be used to provide a smooth base for the finish. The wood filler should be of the consistency of warm honey, and is rubbed into the wood. This causes it to penetrate and unite the cells of the wood and fill the pores. When fully dry the surface is sanded down

to the bare wood. Only the wood filler in the pores is useful, that on the surface being extra weight. The next two coats of glider polish are brushed on with intermediate sandings with #10-0 sandpaper. Although the ingredients of a good finish are important, 90% of the results depend upon careful sandings. Elbow-grease is cheap, so use plenty of it. If you desire an extra high luster apply a coat of Johnson's Glo-Coat or auto Simonize.

TAIL SURFACES

The tail surfaces are made by the same procedure as the wing. Care must be taken to prevent the thin surfaces from warping, therefore only one coat of polish is applied over the wood filler.

The elevator shape used has the advantage of a longer tail moment arm or a shorter stick, because the area is further to the rear than when an elliptical outline is used. This allows lighter construction and less clay to be used as balance on the nose.

The rudder is slightly higher than common practice dictates, but this has been found to be more effective in flight due to the fact that it is not blanketed as much by the elevator at high angles of attack.

FUSELAGE

Wood of the same weight as the supporting surfaces should be chosen for the fuselage blank. After long experience it has been found that this type of fuselage has great advantages over one which is quite hard and thin. It is stronger and lighter. The thin, hard fuselage tends to flutter when thrown hard, which increases resistance, and will also vibrate violently and shatter upon impact. An elliptical cross-section shape has been chosen because it offers less drag in all flight positions.

The fuselage shape is such that it gives a fine stable force arrangement with good practical features. The semi-wing mount integral with the fuselage allows a good firm grip, yet does away with extra time and glue joints necessary when a built-up wing mount is

ANNUAL GLIDING AND SOARING NUMBER

In addition to our regular Gliding and Soaring Department, the July Air Trails will feature Harvey Bowlus' "Baby Albatross" on the cover, with a descriptive, illustrated article on the ship by Frank Tinsley. The Model Department will contain plans for a miniature model of this plane.

★

The image shows the front cover of a vintage book titled "FLYING FOR 1938". The cover is dark, possibly black or dark green, with a large, light-colored, stylized illustration of a biplane in flight. The biplane is depicted in a simplified, almost geometric style, with its wings and tail clearly defined. The title "FLYING" is written in large, bold, white capital letters across the top, and "FOR 1938" is written in smaller, white capital letters below it. The book is shown at an angle, revealing its thickness and the spine on the left side. The spine also has some text, though it is not clearly legible. The overall design is typical of the late 1930s, with a focus on aviation.

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If you are inexperienced at flying gliders try to follow this procedure. But practice is necessary. It requires time and patience to develop a good glider arm for maximum altitude and a good pull-out at the peak of the flight.

PUSHBUTTON PILOT

(Continued from page 31)

The chief didn't even hear him. He was already swinging the plane around, heading back to the clear air above to try to find Section Two and indicate to Barton what the trouble was. But beyond that he was stumped.

Jerry wasn't, though. "See here," he told the chief (and I mean told, not asked), "when we find Barton I can fly formation with him and he can land us both at once with his radio."

That wasn't as crazy as it sounded at first. The chief knew that Army pilots could fly formation in clear air and he knew they could land in formation, but a formation landing in fog was something else again. Well, it was their only chance. Now, maybe the chief should have tried it himself, and I'm not saying that he couldn't have done the job, but as he considered that in all his years of flying in all kinds of planes and all kinds of weather he hadn't had as much as ten minutes of formation flying, he made the right decision, turned the controls over to the kid and watched him go to work.

In a minute they were above the clouds again, and luck was with them, for just ahead they saw the sun shining on the metal wings of Section Two. Jerry swung his plane in a large circle and gauged the turn beautifully so that he came in close alongside Barton's plane, flying parallel to it. That was a smooth piece of work in itself, at those high speeds, and the chief felt his confidence in the kid rise a hundred per cent.

Barton was looking at them curiously, wondering what was going on, so Jerry indicated that his radio was no good by holding up the headset where Barton could see it and shaking his head and holding his nose. Then he held up both hands side by side, like this, imitating two planes flying in formation. Barton began to get the idea and he nodded very emphatically to show Jerry that he understood. Then he turned back to his own instruments, spoke into the radio to tell the ground station what was going on, cut back the throttles a bit and started for the ground.

Now, it seems that the big trick of

landing in formation is to keep close alongside the leading plane without overtaking it. That's hard enough at any time, but the problem is complicated on these transport planes because we land them with the wing flaps, or air brakes, turned down to reduce the air-speed. Jerry knew that in the fog and darkness he wouldn't be able to see Barton lower the flaps on the leading plane, so he told the chief, "You stand by to put the flaps down as soon as I have trouble staying behind Barton, and for God's sake work fast." Then he settled himself into the seat, pulled his safety belt tighter, wrapped his hand around the throttles and flew formation.

They were losing altitude rapidly and Jerry was flying to the right of Barton's plane and a little behind it. Just before they went into the clouds he slid in so close to Section Two that the chief held his breath for a long minute as their left wing tip played tag with the trailing edge of Barton's right wing. It must have given the passengers a thrill, but passengers are pretty good about such things. If something goes wrong they either don't know enough to be scared or they won't show it in front of other passengers.

Both planes had turned on their running lights just before going into the clouds and the fog made a green haze around Barton's right wing light, just ahead of the red glow around Jerry's left wing. Section Two was just a dim shape in the fog.

Have you ever flown formation on a bumpy day? No, of course you haven't. Well, it's hard work, even when you don't have fourteen passengers depending on you, and Jerry was sure feeling his responsibility then. He had to hold his plane in close to Barton's for if he once lost contact in that fog he'd never be able to find it again, but the wing wash from Barton's plane made such close formation darned hard work physically as well as mentally. He sure didn't have time to look at any instruments. It was just a case of control stick, rudder and throttles, watch the other plane and keep his position at all costs.

When they were down to three thousand feet it was so dark that the outline of Section Two had faded and Jerry had nothing to steer by except the green glow from Barton's wing. He was fighting the controls in the bumpy air, but he was keeping his place so steadily that the chief could hardly see any change in the relative position of the planes, just a little rising and falling as though they were anchored side by side on the ocean and moving up and down on a gentle ground swell.

At about a thousand feet Barton swung in a wide circle to pick up the auxiliary or "localizer" radio beam about two miles from the airport. Jerry was on the outside of the circle and had to gun both motors and bank pretty steeply to keep his position, and as Barton squared away for the landing and began to slow his glide, Jerry had trouble staying behind and yelled at the chief to put the flaps down. The chief worked fast at the controls, but the flaps came down slowly. Barton, not being used to leading formations, had cut his own speed too quickly. The red wing light on Jerry's plane began to creep up on the green light on Barton's. The red glow was actually blending into the green one. I'll tell you, mister, the chief was scared. But Jerry had one more trick. He kicked that plane into a steep side slip, pulling the nose way up into the air to kill the speed. He treated that big transport like a tiny pursuit plane, but he kept his wing tip in position behind Barton's.

Gradually the chief got the full braking effect from the flaps and Jerry straightened out to level flight.

They were down low and gliding in with just a little power on. Still no sight of the ground. Nothing but blackness and the green light on Section Two. Jerry was matching every air bump and every movement of Barton's plane with quick, precise handling of the controls. The chief braced himself and put one hand on the master ignition switch, just in case, and waited. Jerry pulled the nose of the ship up a little, holding it just above stalling speed, in landing position, two or three feet lower than Barton's plane.

Suddenly it was all over. There was a slight jar and then both planes were



The QUESTION MARK

All questions pertaining to model construction problems should be addressed to Gordon S. Light.

Answers will be given promptly by mail, thus avoiding delay.

Enclose stamped, self-addressed envelope.

LIGHT PLANE FLYING CLUBS

(Continued from page 26)

made in aviation during the past twenty years have been made in legitimate circles, by licensed engineers, licensed mechanics and licensed pilots, in recognized factories and on regulated fields. I am no Pollyanna who believes the airplane is a fool-proof instrument, for to date it most certainly is not. A certain amount of skill and training is required to control the modern plane and the minute we attempt to ignore this undeniable law, we are well on our way

and if we feel that there is justification in bringing the matter before the Bureau of Air Commerce, we'll be more than pleased to do so.

We can promise no more, but we do hope you will take this matter seriously and take time to present your case as clearly and rationally as possible. You, who are out there on the club fields, and who are paying for your light-plane experience and training in cold cash, may have an entirely different slant on



Al Menasco and his new 50 h.p. light plane engine. In the April issue this engine was erroneously described as a Continental.

toward disaster. We only have to look over the history of commercial aviation in this country, the most progressive system of air transport in the world, to realize what an important part strict supervision and sane regulation means.

But there may be a justifiable argument somewhere, and we want to make certain that nothing is left undone to remedy any condition which appears to impose undue hardship on the light-plane man, or which restricts the advancement of the flying club. We want your straight story, in which you quote the actual clause or rule in the new Civil Air Regulations that honestly interferes with your progress. We will gladly investigate it from every angle,

this all-important question. If so, we want to know what it is.

Will you cooperate?

FLYING CLUB NOTES

Harold H. Briggs is a leading light in the new Portland Flying Club of Portland, Oregon. Briggs has written telling us how the organization is attempting to make things easier for the private flyer. We hope Briggs will be among those who will help us out with some constructive criticism on the new Civil Air Regulations.

L. A. Stinard of Cadiz, O., took April delivery on a new Cub and has sent in his application for membership in Air

Adventurers. We trust Stinard will keep in touch with us and let us know of his progress this summer.

Attention, Canadian flying clubs! R. Hatton of R. R. 5, Alvinston, Ont., is anxious to get into a flying club. He claims he has tried to join the London Flying Club and the Community Flying Club but has discovered that they are unable to accept his membership. He is willing to travel anywhere within 100 miles of Alvinston.

William H. Millis, Jr., of 3059 East 91st Street, Chicago, Ill., is trying to organize a non-profit flying club in that district. Bill claims he has a field and an instructor who will give flight training for \$1.00 an hour. The instructor has had night-flying and instrument-flying experience. Under the planned set-up, Bill believes he can give up-to-date flying training for a total outlay of \$3.00 an hour.

"They all talk flying," argues Bill, "but few of them really want to lay their money on the line. Most of them are of the opinion they can pick up an old crate for about four hundred dollars and get the former owner to teach them to fly for nothing."

Bill believes he can start at once if he can get about fifteen members, men or women, who really want to learn to fly.

There you are, Chicago. Get in touch with Bill Millis, if you are interested.

Another Chicago secretary, Matthew E. Rodina of the Garfield Flying Club, invites all interested who live in that vicinity to turn out for the club meetings which are held every Friday evening from 7 to 10 p. m. at the Garfield Recreation Center, 100 N. Central Park Avenue. H. A. Maurer is the club's flight supervisor, and Major John R. Stiles, the ground instructor.

A Great "GUEST EDITOR" Next Month!

JACK FRYE, President of TWA,
will be the guest editor of the July **AIR TRAILS**

He will write the month's editorial, a personal message to Air Trails readers, from one of the great figures in American aviation. Don't miss this issue with the life story of Mr. Frye.

The First of a series of Great Guest Editors.



"Now why do they want me to practice this for?"

Dougal Cushing was recently elected president of the Montreal Light Aero-plane Club for 1938. He succeeds Dr. D. P. Mowry, the retiring president. Other officers elected for the ensuing year were Capt. G. R. Beck and Dr. R. Simard, vice-presidents; Leslie Choyce, honorary secretary-treasurer; A. A. Monson, F. W. Dougherty, W. R. Couture, C. H. Kenyon, H. Wisenthal and D. D. Thomas, directors.

During 1937 the club logged 18,000 miles in cross-country flights and more than 200 flying hours were successfully completed by members. Not one accident was encountered in that time. Pilots of the club booked 1,047 flying hours during 1937, which included 371 hours of dual instruction, 270 hours of student solo, and 330 hours of passenger flying. The balance was taken up in routine test flying.

ALPHA ETA RHO, AVIATION FRATERNITY

We are indebted to Merle S. Burdick, of Northwestern University, for the following interesting account:

A well-organized attempt to bring aviation before the college student is at present under way in several universities. This movement began in 1929 at the University of Southern California when Alpha Eta Rho, the international aviation fraternity, was organized under the direction of Dr. Earl W. Hill, professor of air transportation. Late in 1936, charters were given to the university of Southern California, located at Los Angeles, and, in February, 1937, to Northwestern University at Evanston, Illinois.

Alpha Eta Rho members take part in a number of activities. These include weekly meetings, monthly dinners featured by guest speakers from the aviation industry, field work, participation in aviation events, and actual flying.

Although the organization is in no sense a flying club, the majority of the members are pilots. An example of the activities in a local chapter is shown by a survey of the Northwestern University Chapter. It is composed of approximately twenty-five young men and women who have shown that they have a definite interest in aviation, regardless whether the interest be in actual flying or in the business field. Twelve members hold private licenses, three amateur ratings, and five student rat-

ings. Membership, not confined to any branch of education, is composed of students of engineering, air transportation students, members of the Naval Reserve Unit at the university, liberal arts, speech, and education students. Thus it is seen that the membership and interests are varied.

Prominent men in the flying field are always invited to the meetings and dinners as speakers in order to give the members a broader outlook on air problems. These guests have included U. S. Navy officers, air-lines officials, aviation pioneers, manufacturers, air racers and others too numerous to mention here. Many times major air lines and other private organizations have loaned motion picture films of the industry. Recently, a motion picture of the 1937 National Air Races was exhibited at a chapter meeting.

Field trips have been taken by Alpha Eta Rho to local aircraft manufacturing companies, air-line bases, military, and naval airports.

Recently, Jack Vilas, president of the successful 1938 International Air Show in Chicago, and associate member of Alpha Eta Rho, made arrangements for the chapter's participation in the air show in order that the fraternity might establish better contact with the industry. General information, distribution of the "Fly Paper," news organ of Alpha Eta Rho, free rides, and registration for members of the industry were only a few of the services rendered at the air show.

The fraternity, with its twenty active flyers, manages to keep the nearby airports busy. A few months ago, all active members were given associate memberships in the North Shore Flying Club with the benefits of club rates for instruction at Sky Harbor Airport.

It can easily be seen that an organization such as this is able to provide a nucleus for a nationwide chain of similar chapters. Alpha Eta Rho stands for the promotion of air-mindedness and confidence in aviation among college students, who are potential private plane owners and air-line travelers.

All students of other universities who may be interested in starting a chapter, or those who desire more information about the fraternity, are invited to write the corresponding secretary, Merle S. Burdick, Sigma Nu Fraternity, Northwestern University, Evanston, Illinois.

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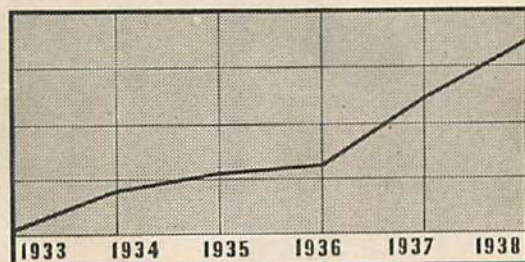
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