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# AIR TRAILS

*Europe Preen Her Wings* by **CLYDE PANGBORN**

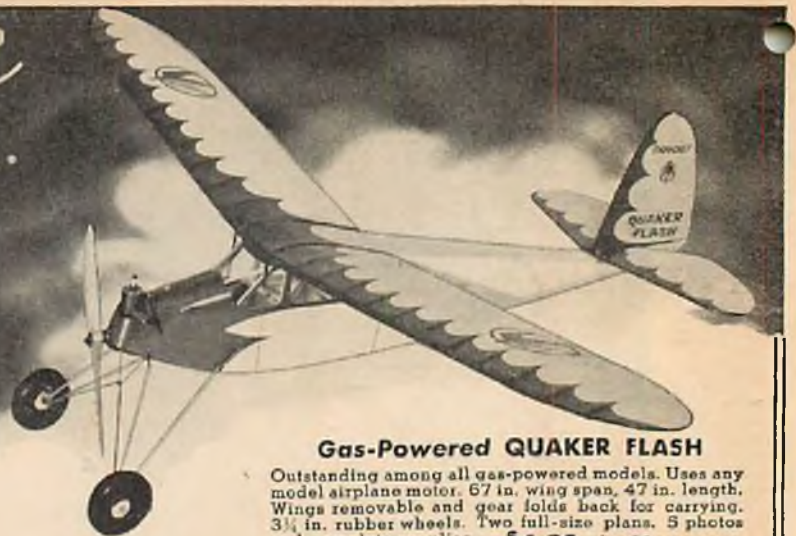
MARCH 1938



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## Consulting Editor

F. Orlin Tremaine

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## Light Plane Editor

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Alexis Dawydoff

## Model Editor

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## Model Board

Gordon S. Light

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# How Jerry Got His Start in AVIATION

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?

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

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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.

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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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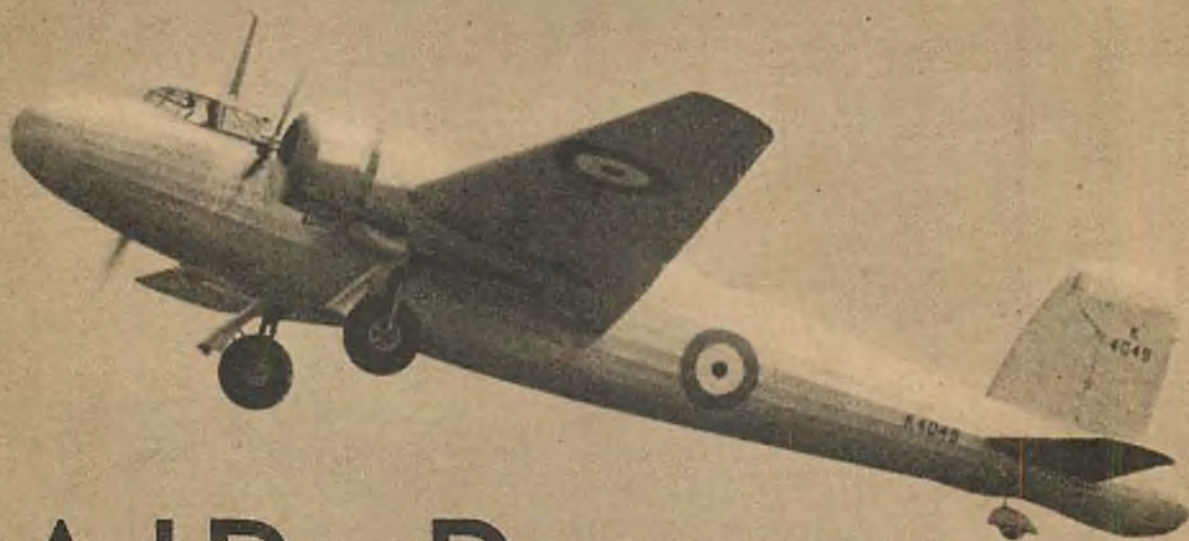
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# AIR Progress

## A Summary of Aviation News

### TRANSPORT

An allotment of 17,900,000 cubic feet of helium has been granted by the Munitions Control Board to agents of the German Zeppelin Co., presumably for use in the sister ship of the ill-fated *Hindenburg*.

Air France *Transatlantique* has ordered a Farman 2330 which will have a fuselage designed to permit flotation in case of a forced descent, and a supercharged cabin. It will fly at heights between 20,000 and 26,000 feet.

A considerable shake-up in British commercial aviation may soon take place as the result of a debate recently held in London. Charges that aircraft were inefficient, airports were nothing more than cheap landing grounds and that air lines were under the control of two main financial houses, were among the points raised. A move to take civil aviation out of the hands of the Air Ministry and place it in the hands of the Transport Ministry was also brought up.

Many new airports are now under construction all over the country. San Francisco has approved a bond issue for \$2,850,000 for the enlargement and improvement of the present municipal airport. Buffalo will spend \$1,200,000 on a modernization project. The new seaplane station at Baltimore, now being used by the Bermuda Clippers, is about 80 per cent complete. Land planes should be able to use the new runways late this coming summer.

Three noted racing pilots have been assigned air-line pilot positions with TWA: Roger Don Ray, who won the title of "Champion Racing Pilot" in 1936; Harold Neumann, consistent winner at Cleveland; and Bob Buck, former junior speed pilot, have given up speed for the mathematical precision of transport work. Roscoe Turner is now mid-West distributor for the new Starman-Hammond tricycle plane.

Major Jimmy Doolittle has taken delivery on a new single-seater Seversky which will be used for experimental flying at heights between 25,000 and 30,000 feet and the testing of Shell 100 octane gasoline.

The post-office requirements for a mail plane to be used in Alaska were so stringent that no designer in this country could build a ship to cover the demands. The department demanded multimotored planes with seats for ten passengers and room for 800 lbs. of mail. The Bureau of Air Commerce has explained that such a ship could not be built that would comply with these specifications, carry the emergency equipment necessary and, with any degree of safety, use the fields available in Alaska. The specifications have been changed to permit the use of planes with a smaller load capacity.

Plans for the Maritime Committee to take control of ocean air lines is meeting stiff opposition from the House Post-office Committee. Chairman Mead of the Post-office (Turn to page 63)

Above—The Vickers Wellington, two 950 h.p. Bristol Pegasus engines. Geodetic or "egg-shell" construction employed in the Wellington resulted in a phenomenal cruising range.



# Train this winter at **RYAN** in modern equipment

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Leave Old Man Winter behind and come to sunny San Diego for aviation training. Here is the year 'round paradise for the student pilot, mechanic or engineer where thorough training costs no more and living costs are actually less. ★ RYAN is America's oldest aeronautical school—now in its 15th year under the original, progressive management. Its tempo is modern as evidenced by its new, spacious buildings, well arranged shops and location at Lindbergh Field, one of America's finest airports. Its equipment is modern as typified by the Ryan S-C and Ryan S-T. You will train in the same type ships that won such classics as the International Aerobatics Contest, the Amelia Earhart Trophy Race and the Brazilian Sporting Classic at Sao Paulo. ★ Mail coupon below for the new Ryan catalog with courses revised to conform to the new Civil Air Regulations.

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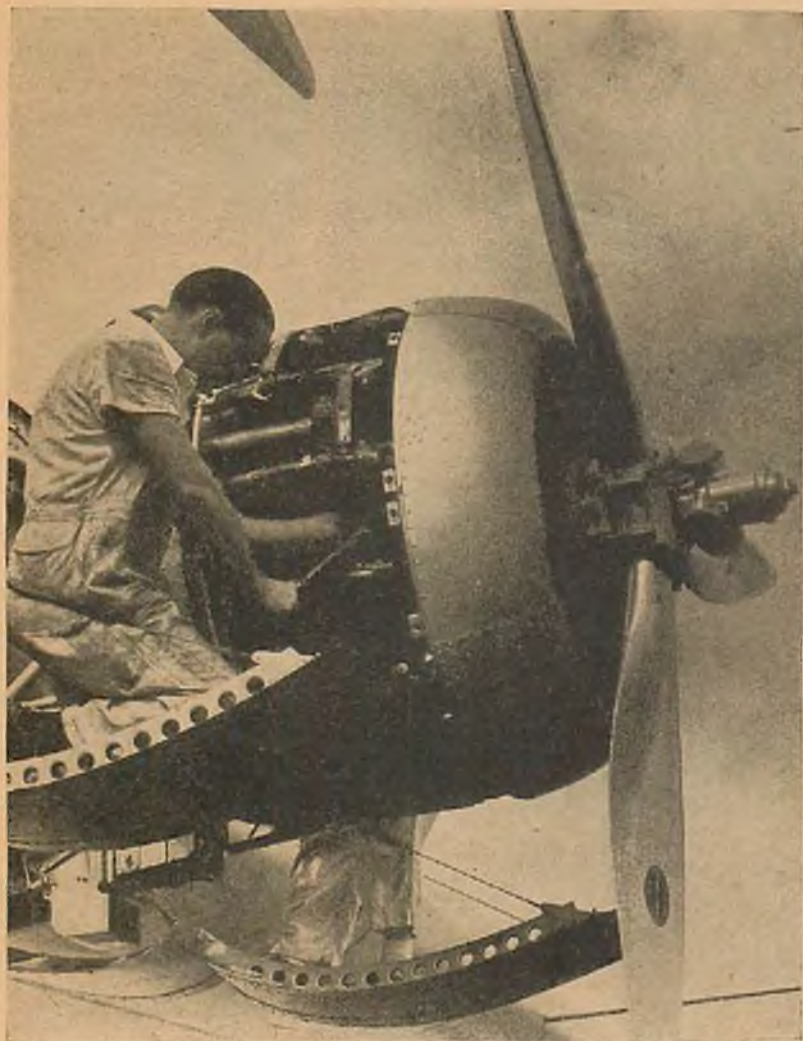
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MECHANICS checking one of the four Twin Wasps of the China Clipper. The curved platforms are hinged, forming part of the leading edge when not in use, thus eliminating extensive scaffolding for minor engine work.

RIGHT—Meteorological balloons rise regularly from Kew, England, carrying scientific instruments to obtain samples of the upper air. Sometimes ascending 17 miles, the balloons burst in the rarefied air, permitting the instruments to descend by parachute.

# This Winged World

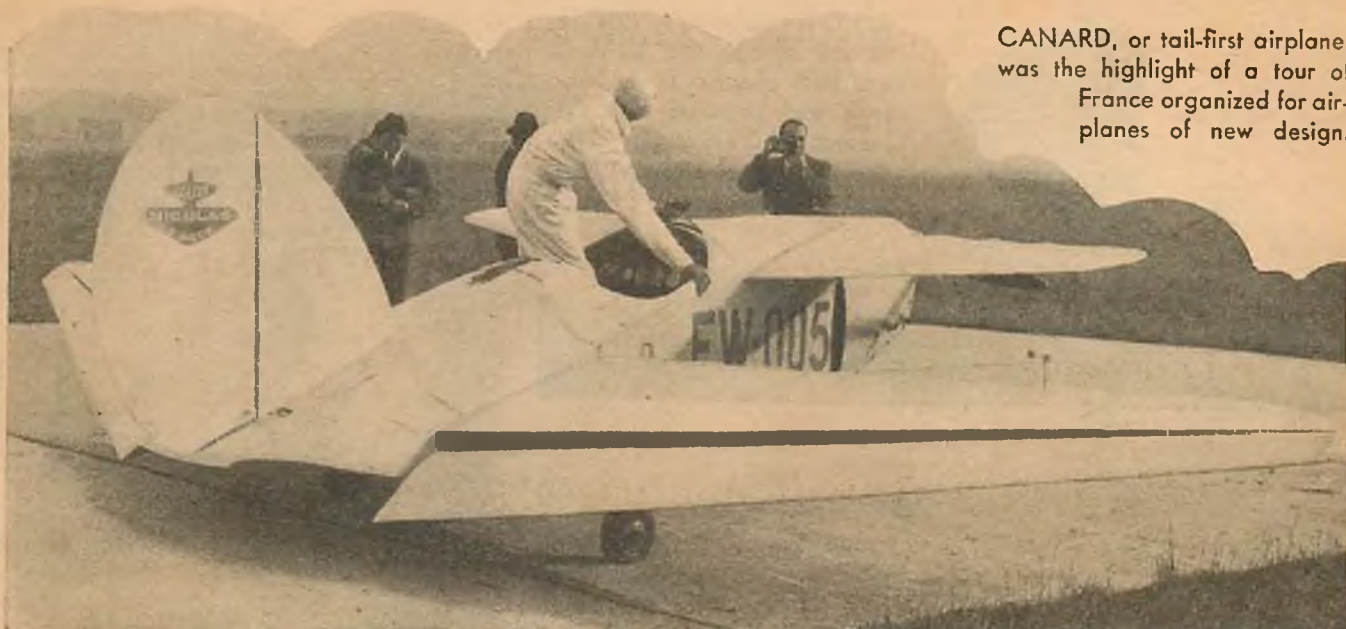


BELOW—Engine of destruction is the Boeing YB-15, greatest of all American bombers. Four 1,000 h.p. Twin Wasps drive the 150-foot monster at speeds far greater than 200 m.p.h. Complete living quarters keep the crew at peak efficiency for long-distance raiding.

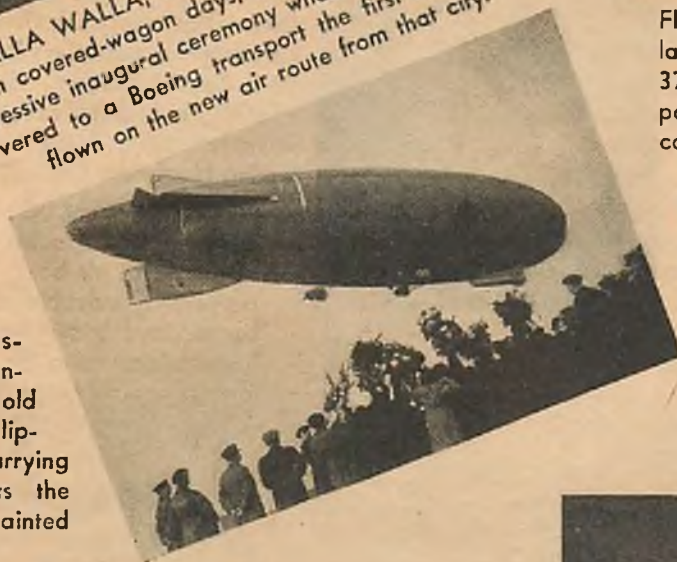




CANARD, or tail-first airplane, was the highlight of a tour of France organized for airplanes of new design.



WALLA WALLA, Washington, old center of Oregon covered-wagon days, was the scene of an impressive inaugural ceremony when stage coach delivered to a Boeing transport the first mail to be flown on the new air route from that city.



FLEXIBLE CANNONS for defense are the latest sensation in bomber design. This 37mm. cannon fires a shell weighing over a pound. The shells, nonexplosive prematurely, can be fired at the rate of 100 per minute.



SOVIET DIRIGIBLE landing near Moscow after setting 130-hour endurance record.

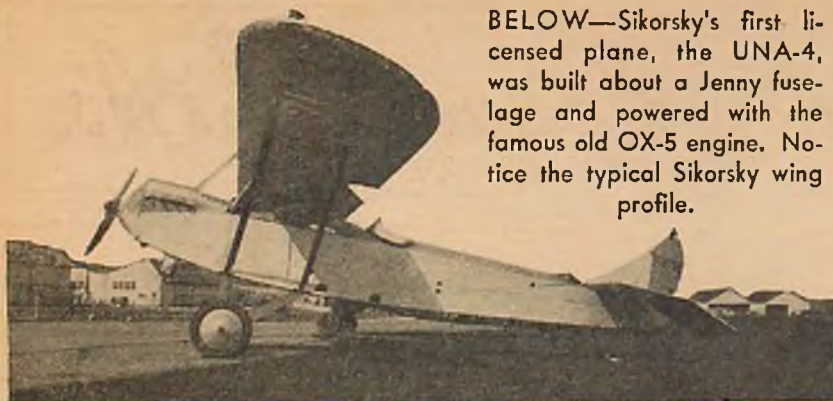
BELOW—Reminiscent of ocean-spanning clippers of old are the aerial Clippers of to-day, carrying to Oriental ports the American flag painted on their bows.



HUMAN BAT is Mickey Morgan who glides for 90 seconds on flimsy wings from two miles in the air before opening the 'chute at 1,500 feet.







BELOW—Sikorsky's first licensed plane, the UNA-4, was built about a Jenny fuselage and powered with the famous old OX-5 engine. Notice the typical Sikorsky wing profile.



ABOVE—Bristol Blenheim bombers roar over at 280 m.p.h. in an impressive inverted pyramid of British bombing power. These twin-engined bombers are standard equipment of many bombing squadrons of the R. A. F.



LEFT.—Outstanding development in radio antennas for transport flying is the new shielded ring type of Northwest Airlines. This transparent nose incloses the ring antenna, protecting it from ice formation. Demonstrated to have improved reception, the resultant refinement in streamlining benefits an increase of two m.p.h.—saving Northwest Airlines \$10,000 a year.



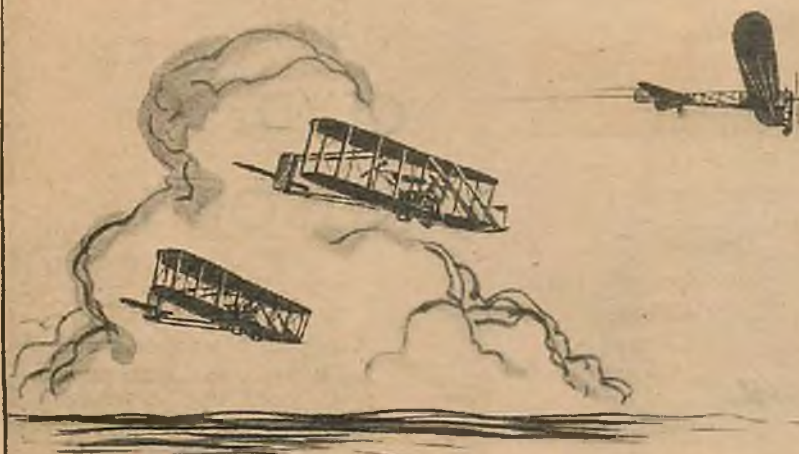
RIGHT—Triple parachute jump for the benefit of French youth at an air fête at Vincennes, France.

BELOW—Vought "Corsair" seaplanes in their castored cradles for land servicing at the naval air base. These cradles are particularly valuable when the ships must be serviced in any number that require frequent movement about the repair shop.



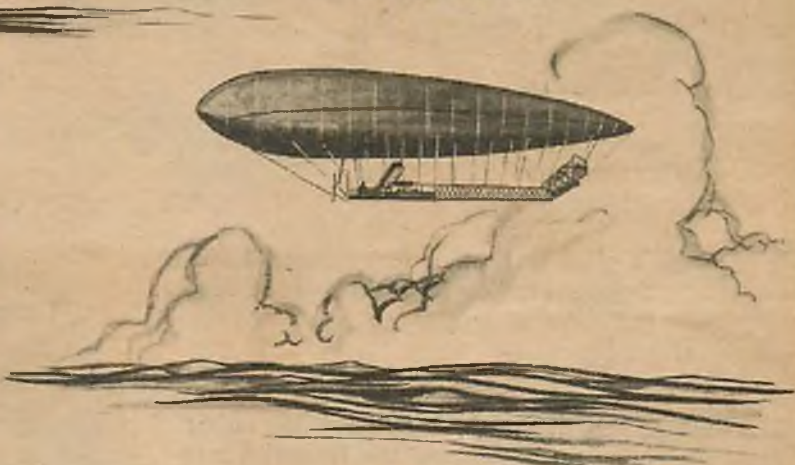


# Pictorial History of Man in the Air



1910 - THE INTERNATIONAL AVIATION MEET HELD AT BOSTON, SEPT. 3-10 WAS CLIMAXED BY THE GREAT RACE AROUND BOSTON LIGHT AND BACK. THE WINNER WAS GRAHAME-WHITE OF ENGLAND WHO WON THE \$10,000 PRIZE BY FLYING THE 33 MILES IN 34 MINUTES, 1 AND  $\frac{1}{5}$  SECONDS, IN HIS BLERIOT.

1910 - THE FIRST CHANNEL CROSSING BY AIRSHIP TOOK PLACE ON SEPTEMBER 16 OF THIS YEAR WHEN "THE CLEMENT-BAYARD II," THE FIRST FRENCH NON RIGID AIRSHIP TO BE DELIVERED TO THE BRITISH ARMY, ARRIVED AT LONDON. SHE COVERED THE 242 MILES IN 6 HRS. AT 40 M.P.H.



1910 - THE FIRST ATTEMPT TO CROSS THE ALPS BY AIR ENDS IN TRAGEDY SEPTEMBER 23, 1910. GEORGES CHAVEZ COMPLETES THE PERILOUS TRIP ONLY TO CRASH BUT A FEW MILES FROM HIS GOAL AT MILAN, ITALY, WHEN HE FELL FROM THIRTY FEET UP AS HE WAS LANDING FOR GAS. HE DIED 4 DAYS LATER FROM HIS INJURIES.



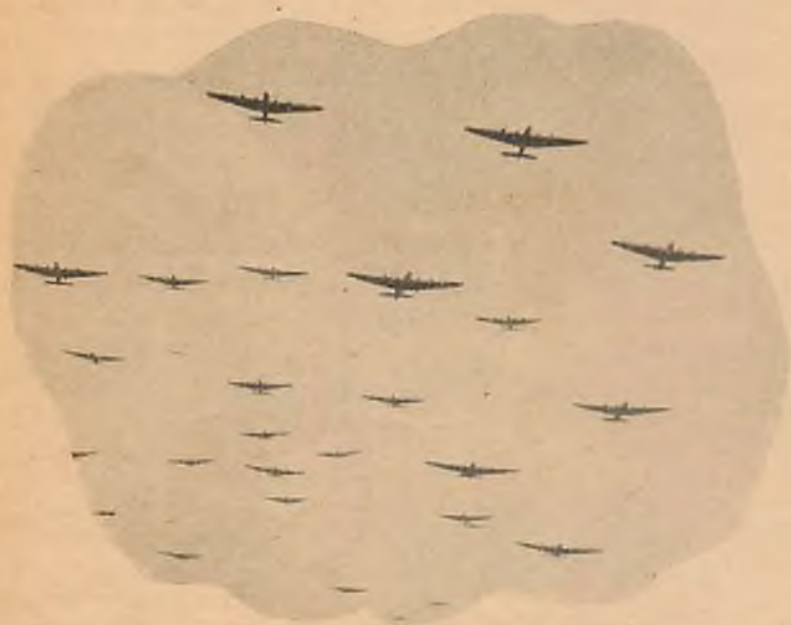
1910 - THE DAY FOLLOWING THE TRAGIC DEATH OF CHAVEZ, MAURICE TABUTEAU COMPLETED THE FIRST AIR CROSSING OF THE PYRENEES FROM SAN SEBASTIAN, SPAIN, TO BIARRITZ, FRANCE, ON SEPTEMBER 28, 1910. THIS PILOT WAS LATER TO INSTRUCT BRITISH FLIERS OF WAR FAME.





# EUROPE PREENS

BY  
CLYDE  
PANGBORN



Part of Russia's gigantic fleet of four-motored bombers climbing from their base to pass in review over Red Square.

I HAVE been here in Europe since the middle of last June attempting to demonstrate the Burnelli plane to several European manufacturers. As many of you probably know, I have traveled through most of the important countries and, as usual, have had my regular brush with Customs officials, frontier guards and emigration authorities. In that time, also, I have been studying at close quarters what may go down in history as the greatest period of military craft advancement the world of aviation has seen.

To say that I have been impressed would only be putting it mildly. As I consider it all again, I wonder whether I have been looking at a dress rehearsal of a new Armageddon. I came to Europe primarily to take a part in and study the commercial side of their industry, but I believe now that I have seen the major countries of Europe preening their wings for war!

To explain how thoroughly I have been able to study this situation at close hand, I should explain that soon after I arrived in England with Mr. Winegard, my mechanic, and the much-advertised Burnelli, we encountered unforeseen Customs difficulties. We realized that it would take a certain amount of time to reassemble the necessary papers and other documents, so—leaving Winegard in charge of the plane—I decided to try a quick trip around Europe's air-line systems. Before I could complete my plans, however, I ran into an old friend who was going to Russia to study economic conditions there. He asked me to accompany him. As it was Saturday afternoon, it was impossible for me to get the necessary visa



A long-range weapon, constituting a threat to distant capitals, is the British Vicker's Wellesley. Geodetic or "eggshell" construction gives the 950 h.p. Pegasus-powered Wellesley the edge in range over rival equipment.

to my passport, but as I wanted to accompany this friend and make the most of his connections, I took a wild chance and went without the visa.

Our trip took us through Holland, Denmark and into Russia—where eventually my carelessness caught up with me and I was held at a Russian port of entry just across the Latvian border. After two days, during which time I was treated with the utmost courtesy, my friend managed to get my papers straightened out and I was allowed to enter. The American Ambassador told me that I am the first person who ever entered Russia without a proper visa. But I owe all that to my very kind friends over there. After a long spell in Russia I later continued



# HER WINGS

*Under the clouds of impending conflict the nations of Europe are working day and night, forging the greatest aerial fleets the world has yet seen. Building programs, new planes and their performances are discussed here by a competent observer.*

In Holland it's the Fokker D-21, capable of 274 m.p.h. with the 780 h.p. Bristol Mercury.



on and passed through Czechoslovakia, Greece, Belgium, France and eventually back to England.

I expect to be in Europe for several months yet, and I hope to be able to send more articles on light-plane flying, transatlantic efforts, and my personal opinions on the rivalry between the flying-boat and land-plane enthusiasts in their race for across-the-ocean supremacy.

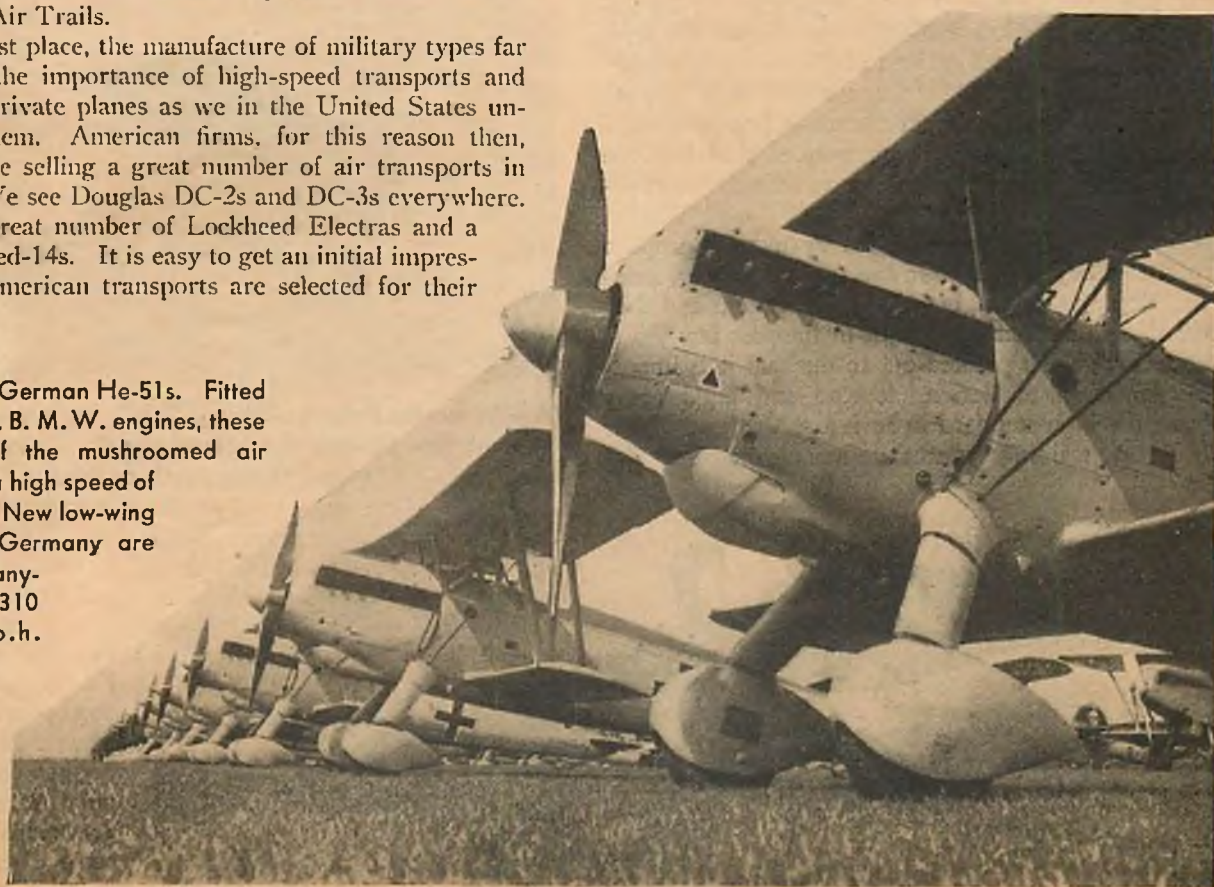
In studying European aviation, one gets a broad view of modern aviation from the lightest of light planes to the greatest of transports. But today, wherever one goes, the terrific speed of the military plane race is most impressive. For this reason then, and because of the general situation here, I feel that I should first explain what is being done, how it is being done and to attempt to draw a few conclusions which may be of interest to the readers of Air Trails.

In the first place, the manufacture of military types far outweighs the importance of high-speed transports and luxurious private planes as we in the United States understand them. American firms, for this reason then, appear to be selling a great number of air transports in Europe. We see Douglas DC-2s and DC-3s everywhere. We see a great number of Lockheed Electras and a few Lockheed-14s. It is easy to get an initial impression that American transports are selected for their

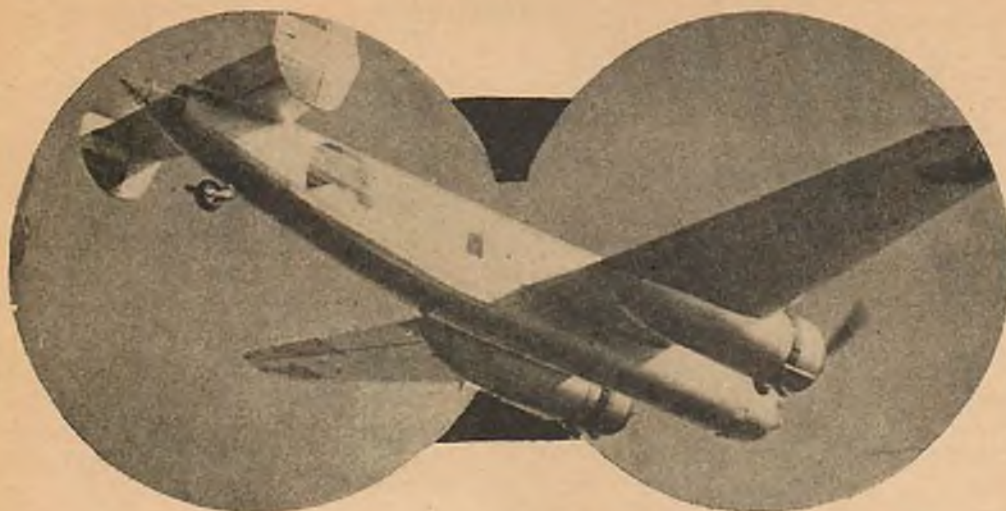
superiority, but this is not the complete story. Practically every aircraft factory in Europe today is engaged in building fighting planes and the transport companies have had to go abroad for flying craft. If the European arms race ever slows up, we shall soon notice a change, for there are some good transports in Europe, particularly in Germany and Italy. Great Britain has a number of line ships in the design and blue-print stage, but so far no one has found time to build them. American manufacturers will do well to recognize this situation and be prepared for real competition abroad if security and peace ever returns to the Continent.

There is no question in my mind about the future air weapon. Today, the bomber is the most-talked-of ship

A line-up of German He-51s. Fitted with 750 h.p. B. M. W. engines, these pursuers of the mushroomed air force have a high speed of 250 m.p.h. New low-wing designs in Germany are said to do anything from 310 to 380 m.p.h.







Tony Fokker's newest twin-engined bomber is a fleet weapon for Holland. The pointed tail turret revolves, keeping the defensive gunner in an upright position at all times.

in Europe. They have studied the big boy from every angle and are building them to fit every military and geographic need. Every effort is being made to build bigger, better and faster bombers. While a number of two-seater fighters and a few single-seaters are being built, there is no question but that the fighter-bomber, as it is known, is the leading and most important type whether you go to Czechoslovakia or Great Britain.

I know you will want to know which European nation appears to be the strongest in the air. I have already been asked that question by many in England. It is a tough question to answer, but after looking them all over, I can't help feeling that Great Britain leads them all. It may be because the general British system is so much like that of the United States that I see things this way. One cannot help but notice the trim lines of their craft and the workmanship of every part from motors to guns. One cannot help but be impressed by their pilots and other members of the service. They are all well-trained and have a great tradition behind them. It is hard to compute their strength in numbers, but with the wide scope of general service the Empire demands, it is no wonder then that the Royal Air Force stands at the top in efficiency and all-around practice.

Germany is considered second by many European experts. They do things in the typical German manner. There is thoroughness to their system and they have turned out some fine craft in the past few years. But I have had it pointed out to me that it is impossible for them to design, develop and build many planes of a high standard in such a short time. Their schools and training systems are among the best. But



The German Messerschmitt BF 109, said to be the only fighter in the world rivaling the speed of the Supermarine Spitfire.



A light Russian fighter. Although Russia has given indication of some fine designs, the bulk of her fighter force is comprised of ships such as this.



For the defense of Paris are these catchy-looking sesqui-planes. Her program bogged down, France now has galvanizing construction and has several 300 m.p.h. fighters in production.



Right—Indicative of Britain's complicated tactics inherent to her position and colonial system are flying boats such as this. Fitted with anti-submarine rapid-firers, they constitute but one small part of a mighty armament jump.



Below—Savoia-Marchetti tri-motored bombers, fastest in Italian service, are much evident in the European tangle. Their 211 m.p.h. speed, coupled with a two-ton bomber load, qualifies them as a formidable raiding force.



Above—Mussolini and staff reviewing an assemblage of Savoia-Marchetti bombers and 242 m.p.h. Fiat single-seaters.

while they have performed remarkable feats in building up an air force in such a short time, it must be obvious that there are many weaknesses there which would pop out in the way of dreadful fatalities should war be thrust on them tomorrow.

Italy comes next to Germany as an air power, they tell me, but one must not be misled by the tremendous amount of official ballyhoo that has come out of Rome in the past few years. Italy has gone ahead in a spectacular manner, creating new records, staging mass flights and bidding for the world's homage. But to those who know, the Italian air service is not considered a first-class service. Some declare it to be a badly balanced service and point out many flaws that showed up even in the Ethiopian campaign, when they had no enemy opposition in the air. They have turned out a good bomber and a splendid flying boat, but the much vaunted Fiats have been no match for modern fighters on the Spanish front.

France is probably one of the most disappointing air powers of our modern day. She has slipped badly in the past two years from a technical point of view. She had, until lately, shown no initiative in design and no particularly good military craft had come out of France for more than two years. The types that have won great esteem at the annual air shows have not stood up or maintained their loud promises. Whether this can be traced to the new nationalization scheme which has bound all aircraft factories into (Turn to page 84)

The Reaper, Fokker's world sensation. Two cannons and a battery of machine guns make this 292 m.p.h. terror an attack-bomber threat, possibly superior to our new twin-engined Curtiss.





# SHROUD LINES

By John DuBarry



In the dim, ghostly light, the biplane roared in a sweeping arc—

**B**LACKIE" MURDO unfastened the safety belt and took the heavy wrench from inside his coat. He stood up, straddling the control stick. The slipstream pushed at him. He leaned against it and raised his arm. With all his strength, he struck at the man in the front cockpit. The blow crushed the back of the man's neck, but savagely he struck again. He caught at the sagging shoulders and straightened the body in the seat. Panting, he drew back and set the stick—flung the wrench over the side. It shone once, far down, in the hazy moonlight and was gone. Blackie Murdo stared after it through his goggles. Then, clutching the cockpit edge, he lowered himself stiffly over the side, hung there for a moment, closed his eyes, and let go.

A sob filled his throat as his fingers reached into soft nothingness.

*One—*

Behind tight-shut eyes he listened to the silent sound of the world. Yes. Yes! Count—! *Two.* Would it? It had to. To ten. Then it had—*three—to open.* It had to. The ring. Where was the— Where, where, where? If he couldn't— *Four—five!* No breathing until— Suffocating. Dying. Hands wouldn't find— *Sir—*

Convulsively he tore at his coat breast, seized something, pulled. Nothing happened. He opened his mouth, to gulp. Then violent hands snatched his legs and a gunshot boomed above him.

He felt himself hanging.

The night-misted horizon rocked before his opened



eyes. Breathing in desperate gasps, he looked down at the steely sheen of the sea, at the white line where it ended against the black land mass of the Florida Keys. Straining upward, he saw the great billow of silk. He moved his arms wonderingly. A ring, with dangling line, was in one hand.

It was quiet all around—real quiet, except for the pounding of his heart. All suped up—because it was his first jump. It'd be his last, too. Guys did it for fun; they were nuts. Never again.

Blackie Murdo looked down beneath his swaying feet. Air—just thin air—two thousand feet of it. A return of the panic he had felt when falling hollowed his stomach, and he dropped the ring and grabbed the taut canvas straps overhead. They were firm as iron. Everything held. He was O. K.—safe. His aching lungs relaxed in a sigh.

It was kind of nice, even. He kicked his feet a little—standing on nothing, but safe as a kid in its cradle. Space all around you. The land and the sea didn't seem to get any closer. Only a little breeze coming up, tickling your nose like you wanted to sneeze, to show you were falling.

How long would it take? Couple of minutes? It could take longer; he didn't care now. He was beginning to enjoy it. Inside him something grew, expanded.



He felt good. The warm summer night was like wine. The moon was slipping in and out among cotton clouds. Floating free—like he was.

Blackie Murdo, for the first time in his evil life, knew the exhilaration of poetic feeling.

It was so peaceful. No coffee grinder swinging a prop in front of your face. He could hear it—way off. He peered into the sky. The 'chute had pivoted, facing him toward the sea. He kicked and twisted, but couldn't get around. Probably wouldn't see it anyway—a black speck, no riding lights.

Still going strong, though. Carrying one dead G-man. Sounded sweet, top. Five hundred horses, and never a balk. Shame to ram that sweet-running mill into the ground. Shame to wash out the Speedwing—flying itself hands off in a shallow power glide. And all going to pot, to make a funeral for one lousy Federal dick!

Blackie Murdo spat downward. The sea looked a little nearer.

But it would make a funeral for himself, too. He grinned, thin-lipped, into the gentle breeze that caressed his face. Oh, he was smart—smarter than Martinez, the dumb heel. Martinez, biggest dope dealer in Havana, had fallen for the guy. Probably in the can by now. Sold him a big order and wanted him flown over to the States with his load of the stuff. Right to the regular drop, too, where the boys could help him.

A rich peddler, huh? Some clever tailing, two pesos for a copy of the cable he'd sent, and a quick frisk of his hotel room had shown him up. An undercover man!

So what? The information the guy had wired washed the whole ring up. It was fly him, or take it on the lam forever.

So he flew him. And how! Tossed away a good plane and engine, but it was worth it. The wreck, and the parachute floating on the water, would spell accident. Conked motor, they'd call it maybe. Nobody would look for Blackie Murdo any more. Blackie Murdo would be written off as dead.

The sea was getting nearer.

He grasped the straps again and pulled himself up a little to ease the cramp in his thighs. A mile swim, or a mile and a half. Cut and fray some of the shroud lines with his knife first so it would look like a natural break, like the 'chute had fritzed. They would think sharks had got the corpse. Sure. But those babies wouldn't bother him while he was alive and kicking. He would take it easy, hide out ashore while his clothes dried, and tomorrow thumb a ride north with some tourist. Then a new name. He had plenty of money. He'd need a new pilot license. Take flying lessons from some hick to make it look good. That would be a laugh!

Motor drone crept into his hearing, cutting off instantly the giddy, racing mind-pictures.

What ship was *that*?

He scanned the shadowy sky, while his heart began thumping again. Somewhere, the plane was coming closer. It—sounded like—

Then a small black shape drifted across a cloud gap—and was gone. But it was there long enough for him to recognize it.

It was his own plane.

He stared after it while everything inside him seemed

to become still. Then his heart picked up, only slower and steadier, and he let out a long breath.

Just that dead guy riding around. He must have slumped sideways and bumped the control stick—banked her a little—made a big circle. Heading for land again.

That was O. K. Getting faint now. She'd hit this time. Better this way, even, than a straight glide—bring the wreck nearer the shore. She'd lost altitude.

He, too. The sea was closing up on him. It wouldn't be long now.

He could make out the silvered tips of the moon path on the long, gentle swells. He was going to get his feet wet. Yeah—a real high-dive, this was! Blackie Murdo, champ diver of the Atlantic—

Well, the Chinaman— But that fat Chink must have hit hard. Boy, that must have been a smack! Six thousand feet, or was it eight?

Blackie Murdo frowned, trying to remember.

That was the only time he'd been in a jam. Those Coast Guard amphibians he could leave like they was back in the hangar. But that night—it was dark—they had run in a fast navy fighter on him. It looked bad for a while. He dumped the Chink quick—upside down—and out. But he didn't need to, the way it ended. He lost them. Got away.

He was traveling now. He could see the swells spreading apart as they grew.

That Chink sure must have splashed hard. Gave a shriek when he left that died away quick. Boy—Dark now. Moon behind a cloud.

Blackie Murdo clenched his hands as the shriek of the Chinese met his ears. His eyes jerked through the air around him. It kept on. It was above him. In the 'chute—

He tilted his head and saw the black hole of the air vent in the center. The air going through— That made the noise. All the way down it had been there, he remembered. He really heard it now for the first time. That damn Chink—!

He didn't feel so good. Lonesome out here. Better if moon— Dead guys, riding the air, yelling in his 'chute— *Nuts to that!* Better get ready. It was coming up fast.

Clamping his hands on the straps overhead, he went rigid as he listened to the drone of a motor.

Coming back. It was coming back. Something was wrong. It should be inland. It should have crashed. The stiff must be leaning on the stick—

Louder. Flying low. It was going to land out here somewhere. This wasn't what—

The moon slid into clear sky and laid a glittering carpet along the sea. In the dim, ghostly light, the biplane roared in a sweeping arc.

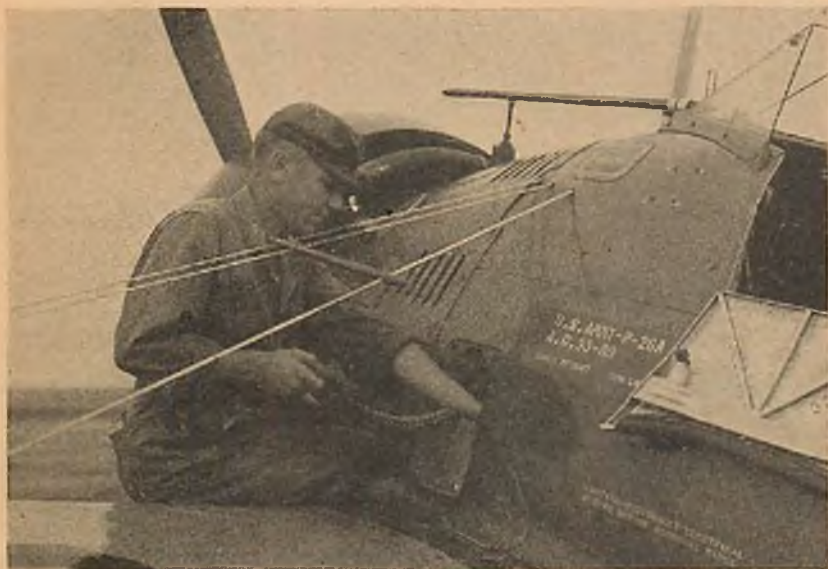
He watched it with widening eyes. It was screwy. It was heading toward him—

Blackie Murdo gripped the straps and tugged frantically. Then he writhed and thrashed like an animal trapped. He began to rave in hysterical gibberish at the lines that lowered him, swaying, while the engine thunder grew louder and louder and the moonlight glimmered on the whirling prop disk, bearing down on him.

Then his mouth sagged open and his throat tensed, but the scream never came. . . .



# MODERN



Armorer loading the belt of machine gun ammunition into a Boeing P-26A. This ship is one of the 77th Pursuit Squadron which won the Luke Trophy for 1936-37 for best pursuit air-gunnery score.



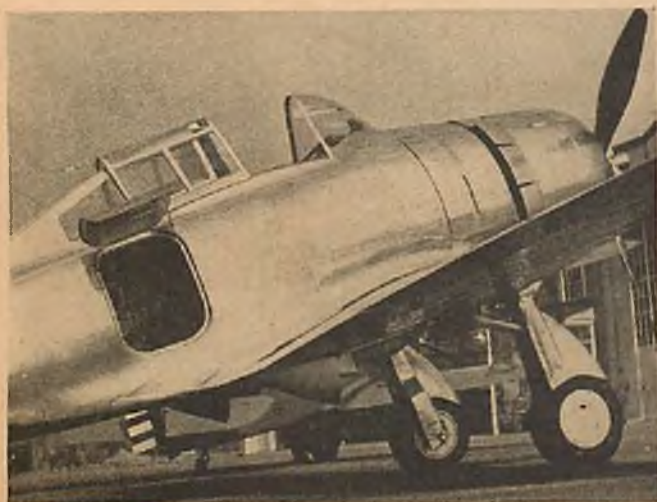
Two armorers of the 77th Pursuit Squadron changing the barrel of one of the machine guns on a P-26A.

*Down through the years in pursuit aviation, armaments, tactics, engines—an informative article worth reading by all adherents of aviation.*

PURSUIT aviation is that branch of an air force which has as its objective the destruction by offensive action of hostile aircraft in flight," said Major General James E. Fechet, one-time head of the United States Air Service. "Its purpose is to cooperate in establishing and maintaining aerial supremacy in the field of operations. Its mission is accomplished when its supported air forces can operate freely without excessive losses and when the hostile air forces can operate only at the risk of disastrous losses."

This is a very comprehensive statement and must be read over several times to get the full significance of its true meaning. Actually then, our pursuit squadrons are really single-seater fighters and the term "pursuit" is very

Below, left, and directly below—Close-ups of the Seversky P-35, revealing many of the interesting details of the design.





# MILITARY

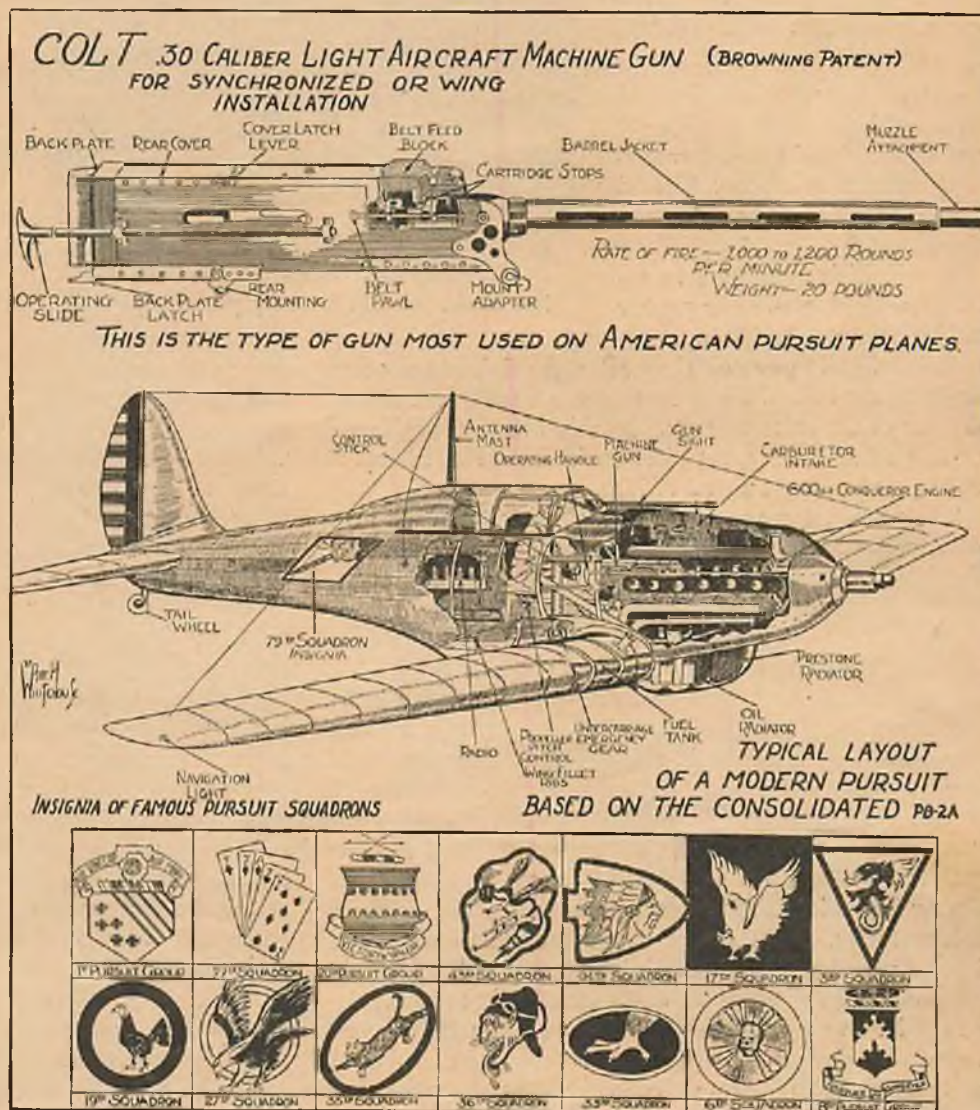
By  
Arch  
Whitehouse

misleading. We must assume that an enemy machine being pursued has already accomplished its mission—whatever it might be—and our pursuits can only chase it away.

The term "pursuit" was adopted from the French term *chasse*, or chaser, during the World War. At the time, it seemed more suitable to single-seater squadrons than the British term "scout" which was a carry-over from the early days when airplanes were not considered as offensive weapons, but instruments to carry out aerial scouting missions. Thus we got the word "pursuit" and we have been stuck with it ever since. Actually, we really mean fighter squadron when we refer to pursuit squadron. After the War the British and other nations adopted the term "fighter." But America has retained, probably through sentimental reasons, the term "pursuit," and France has held on to her *chasse* outfits.

The British idea of "scouting" was exploded as early as August 14, 1914—ten days after the British Army was sent into the European inferno—when a German and a French machine engaged in an "indecisive" duel, in which the French pilot used a Browning pistol. Later, a British pilot actually brought down an unsuspecting German on August 28th, with a regulation Army Webley pistol. That alone ended the future of the airplane as a mere scouting weapon, and from that date on, pursuit, *chasse*, fighter (have it what you will) aviation came into being.

We have seen how at first two-seaters were used as air fighters while the single-seaters were still limited to visual observation operations. At first the observers carried army rifles, carbines and even shotguns into the aerial battlefields. Later they strengthened the general



# AVIATION



Grumman F2F-1s, powered by 730 h.p. Cyclones, squatting on the ground like pugnacious bulldogs, are, in the air, a devastating force striking from the decks of navy carriers.



structure of planes so that a light machine gun could be mounted and they went to war in the air with a vengeance.

For the first twelve months of the War, practically all aerial fighting was done from the observers' cockpits of the two-seaters. Then Tony Fokker devised his interrupter gun gear and turned the single-seater into a weapon that almost blasted the Allied air services out of the skies.

The British attempted to retaliate with single-seater pusher machines that carried a semi-movable Lewis gun, or they set a fixed Vickers at an angle to the line of flight so that the bullets just missed the tips of the tractor props. In this way, by "crabbing" up toward an enemy, the pilot could fire a short burst at an angle at a target ahead of him.

They made the most of these slipshod arrangements while a mysterious Rumanian engineer in the employ of the British Royal Aircraft Factory devised the Constantinesco gun gear, which was far superior to the Fokker device. From that date on, late in 1915, single-seater fighting aviation came into its own. How far it has progressed is a matter of opinion, for we still use the same gun gear in most countries—the same guns and outside of higher power in engines and a few superficial improvements in the way of slots, flaps and variable-pitch propellers, the pursuit, or fighter machine is exactly the same weapon it was when Constantinesco fitted his gun gear to an old Sopwith 1½-Strutter and sent the Royal Flying Corps into action to clean out the Fokker scourge.

Eventually, this form of fighting aviation developed its own peculiar ideas and fighting strategy. Their work, particularly in the French and German air services, demanded that they fight—and destroy. The British had their scout squadrons, but they were expected to work more along escort lines, defending slower types that had particular jobs to do. Also, the British scouts were expected to carry out regular observation work and their reports were collected and studied with the same seriousness as those received from observation squadrons. They, of course, had offensive patrols directed toward ridding the air of German planes. Later on they developed low-flying tactics that played a big part in the ultimate victory on the ground. But they were not out-and-out fighter squadrons in those days. Perhaps this is another reason why American single-seater squadrons accepted the French plan—and name, *chasse*.

True fighting squadrons, whose sole idea was to engage the enemy under all conditions, had to develop new and group fighting tactics. They went in strong for wild maneuvers and the smash-bang type of action. They adopted formation flying, but not to the cleverly planned extent displayed by the British.



A Boeing P-12F inverted in a roll. Powered by 550 h.p. Wasp, this ship was long the backbone of the army pursuit service.

Theirs was a job that had to show results. Combat maneuvers were tried out and stalking systems devised. Armament was improved and increased until the Western Front fighting planes became nothing much more than winged motors carrying two or more synchronized machine guns. Their success was judged by the number of victories scored, and not by the number of hours flown or the reports gathered.

This was the birth of what we now call pursuit aviation.

It suited the French temperament and the American idea of doing something fast—and getting it over. Individuals became heroic gods overnight and the Ace system came into vogue. The value of the system is a matter of opinion, but there are many to-day who feel that the pilots and observers of other branches of the service have never been given full credit for their work and heroic devotion to duty, as colorless as it was.

Still, the single-seaters played a great part in winning the War in the air. Theirs was a dangerous game, the suicide club of aviation, for it required but little—in the right place—to send them to a flaming finish, or a crushing defeat. Fire was their first great enemy. In the two-seaters the observer could often put out a fire while the pilot kept his ship in a side slip. If a single-seater pilot was "knocked out" with a grazer shot or a none-too-serious wound, he simply fell forward on his stick and sent his plane down for the final reckoning. In the two-seater, the observer might be able to fly the plane long enough for the pilot to make some sort of a landing somewhere.

All this, then, is the background for modern pursuit aviation. It is interesting to look over present-day pursuit aviation and see what it all means.

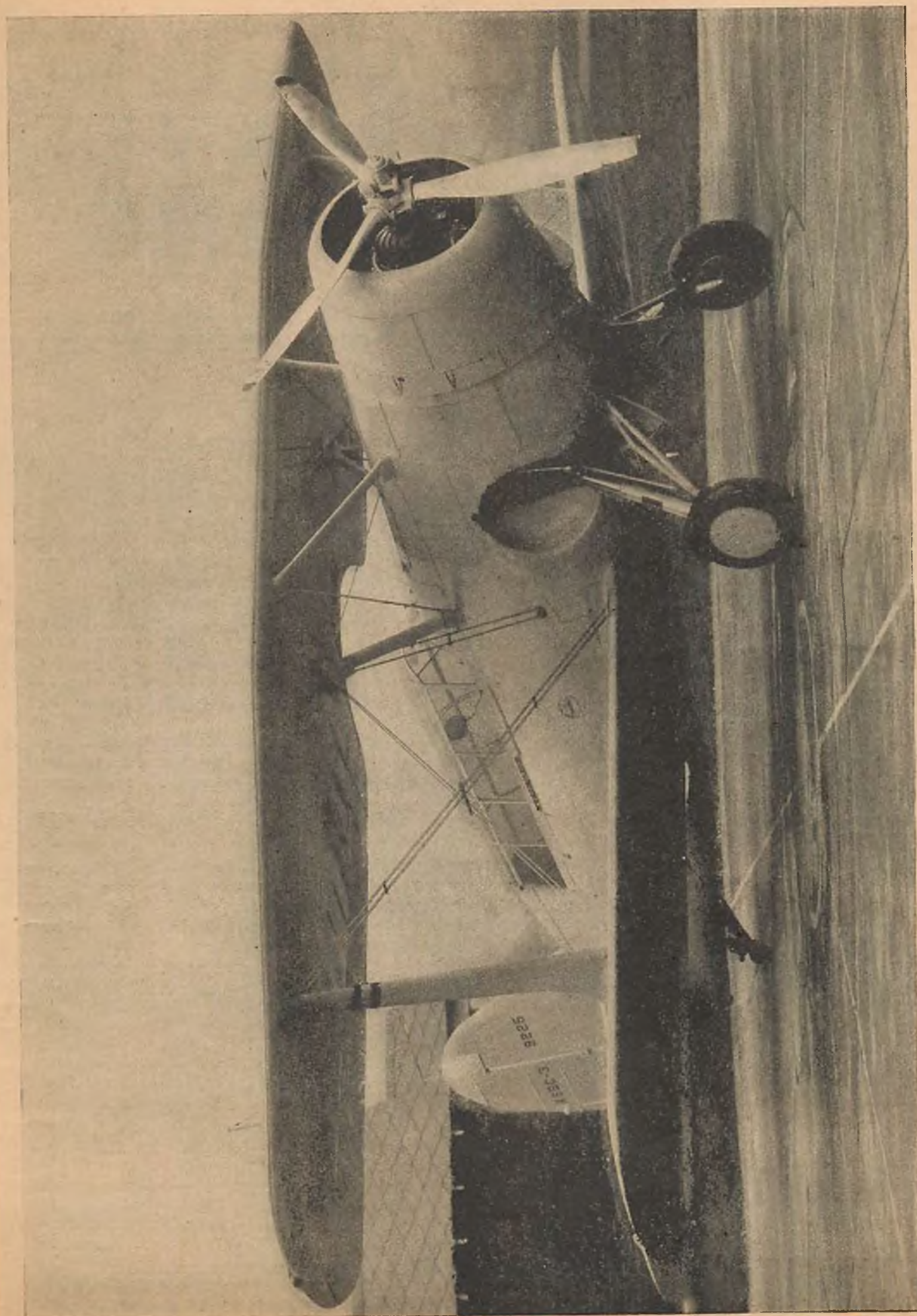
Single-seaters, which are the backbone of pursuit aviation, have risen from the War-time speed of approximately 130 m.p.h. to 300 m.p.h. There are a few types in the world that are rated at 350 m.p.h., but few of them are ready for actual service work. As a matter of fact, there are few pilots in the world that are capable of flying a single-seater at that speed, and training will have to advance to keep strides with the aircraft designers. During the World War single-seaters were powered with engines averaging no better than 250 h.p., whereas to-day our pursuit planes are powered with engines rated from 600 h.p. to approximately 1,000 h.p.

To the average reader, the speed of a plane appears to be the yardstick by which its value or efficiency is measured. Nothing could be more distant from the truth. The best pursuit ship is one which offers a combination of several features. It must be fast. (Turn to page 64)



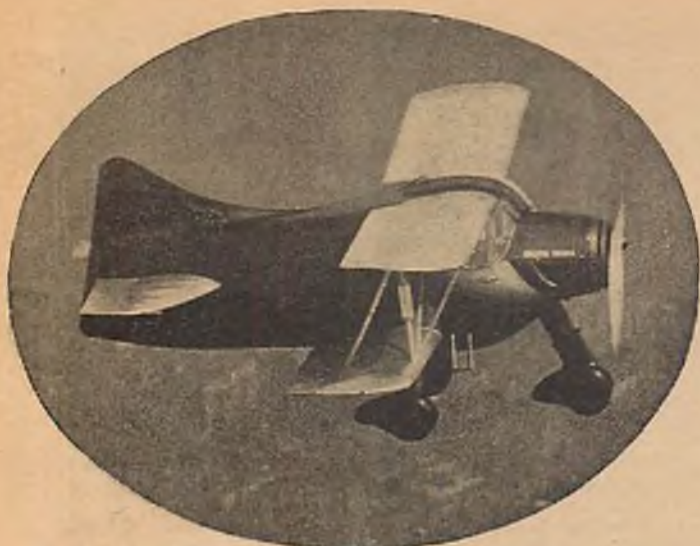
Gunnery targets upon which army pursuit planes dive to test the accuracy of their fire.





THE AIR TRAILS GALLERY—The Twin Wasp-powered Curtiss SBC-3





The Gwinn "Aircar," whose autolike disposition of controls, tricycle landing gear and commendable stability has led to an unusual display of interest. Powered by the Pobjoy 90 h.p. motor, the two-place Aircar was designed to fit a three-car garage. Top speed 120 m.p.h., cruising 110 m.p.h.



Harold Briggs of Portland, Oregon, built this trim low wing. His fourth home-built ship, the "Marion Special," cost \$900 to build. Below—In flight, the ship can hit 135 m.p.h. Bottom—Harold on its 90 h.p. Cirrus. Bottom—Harold Briggs and the "Marion Special." In ten years of flying homemade aircraft, Briggs has amassed 700 hours solo without injury.



# LIGHT PLANE FLYING CLUBS

WHATEVER we may think about the future of the light plane in this country—and I may say that there have been times when I have wondered how soon it would all fold up—there is no doubt but that we must all take our hats off to the 208 light plane owners who swooped down on Miami's municipal airport for the annual All-American Air Races. As a matter of fact, records disclose now that the light planes took the bulk of the show's admiration.

The figure is 208, if you can imagine that many planes in the air at once—a mass flight that puts an end to all boastings about mass flights. The number is 208 flivver planes, none boasting of anything much over 50 h.p., but they all got there and they got there en masse and put on one of the most spectacular scenes ever staged over an airport.

There were Taylor Cubs, Taylorcrafts, Aeroncas and all the rest of them starting out of Boston, Erie, Detroit, Chicago, Minneapolis, Lincoln, Des Moines, Fort Worth, Dallas and a dozen other cities scattered all over the country. Most of them hoiked up off the ground, their tanks blubbing with nine gallons of gas and hurtling through the air at 65 m.p.h. About one in twenty, according to Major Al Williams, had a compass. Less than half carried acceptable air maps. Few of them had ever been beyond the confines of their own air fields, but they started—and they got there.

They devised some trick arrangement whereby any one with a compass was selected as a leader. In groups from four to thirteen they staged formation flights and headed for the east coast. There they were rounded up by higher powered ships and "cowboyed" into some semblance of mass flight. As they approached their destination, they gradually moved into what appeared to be formation and circled the field. They came down in ones and twos and were greeted by massed brass bands, a mayor or two, a couple of governors and given a welcome worthy of transatlantic pilots.

This is the sort of thing we've been harping on for years. We want to see our light plane pilots get out and really fly. We want them to take their flivvers into the hinterlands and let the public see what is really being done. We who live near main airports know all about it, but those who are off the beaten track, have no idea what the light plane pilot and his gang are doing.

If you, yourself, are worried about this light plane



*Light planes in the news, new ships, flying, club news and notes from everywhere.*

Conducted by  
Arch Whitehouse

Do you belong to a club? Have you built a light plane? Purchased one? Then send us a picture.

business, consider this mass flight of 208 flivver planes again. Many of them flew more than 1,500 miles and did it, standing on their heads, as the saying goes. There was nothing spectacular about it to them. They had an objective, a few dollars for fuel and off they went.

You can do it. You can do it in three months, if you go about it the right way. There are dozens of ships to select from and with training systems what they are to-day, there's no reason why you can't spend next summer's two-weeks' vacation covering the country by air.

#### THE NEW AERONCA

We have just received a line from A. F. Davis, of the Aeronautical Corporation of America, on their new Aeronca KC model which uses the Continental A-40-4 or the A-40-5 engine. The difference between these two power plants, by the way, is that the A-40-5 is equipped with dual ignition.

You who are in the market for a light plane should see this new model. It's gone a long step from the old Aeronca era. The new Continental motor has added a substantial look to the job, and we like it. It's true there is a resemblance to the Taylor Cub and the Taylorcraft ships, but the same might be said about many planes and not detract from them in the (Turn to page 93)

This flotilla of planes is but an assemblage of Cubs! As a feature of the Miami Air Races each year, the Sportsmen pilot-owners of Cubs unite to fly en masse to the scene of the meet. Cubs of all vintages testify to the durability of the product.



The Arrow Sport, featuring side-by-side seating for two, is one of the neatest designs on the market. Its 82 h.p. converted Ford V-8 simplifies the service problem.



The Aeronca KC, a companion model to the "K," is powered by the 40 h.p. Continental and features a new-type tripod landing gear. The "K" continues a cantilever strut chassis.



The Continental-powered Rose Parrakeet drew much comment when pictured before in this department. Those who have written us will be interested to know that the top speed is 100 m.p.h., cruising 85 m.p.h., and the landing 35 m.p.h. The ship is one-place.



# WINGED WORDS



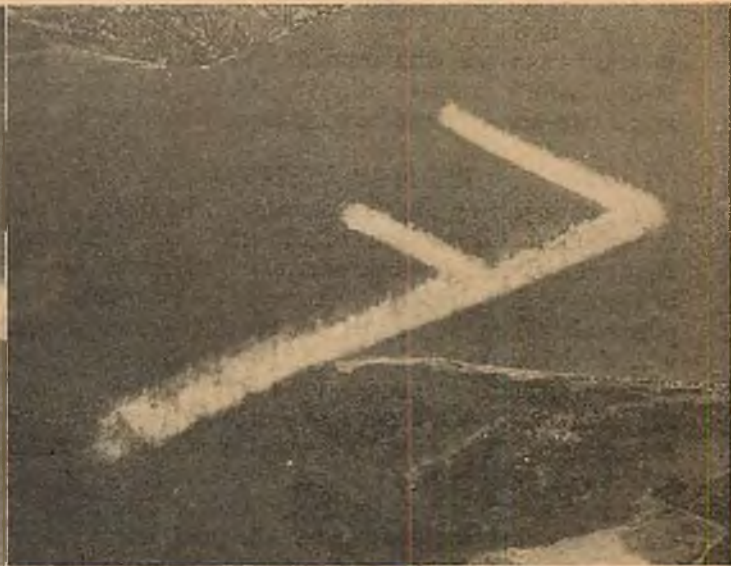
Picture No. 1.



Picture No. 2.



Picture No. 3.



Picture No. 4.



Picture No. 5.



Picture No. 6.



SKYWRITING: Andy Stinis followed by the camera as he weaves mile-high letters and ten-mile words. Complete description on page 95.



Picture No. 7.



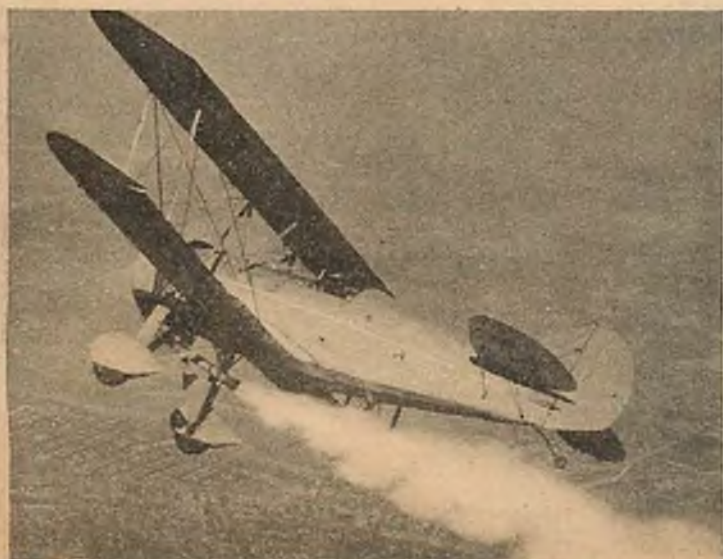
Picture No. 8.



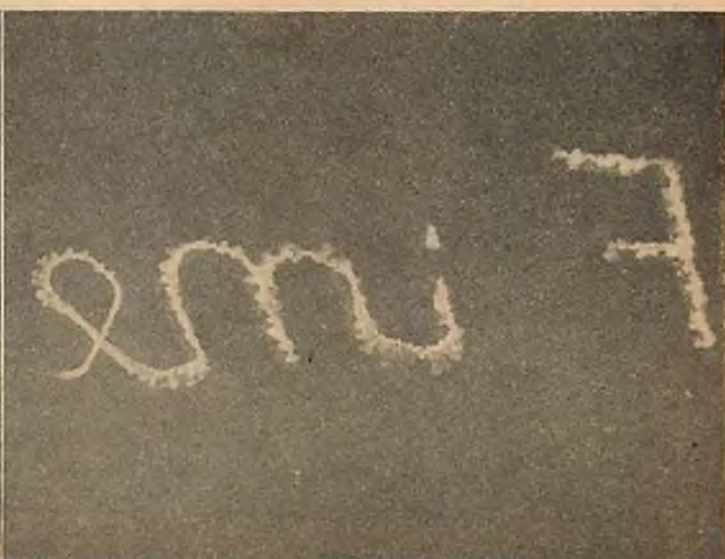
Picture No. 9.



Picture No. 10.




Picture No. 11.



Picture No. 12.



# GLIDING AND SOARING



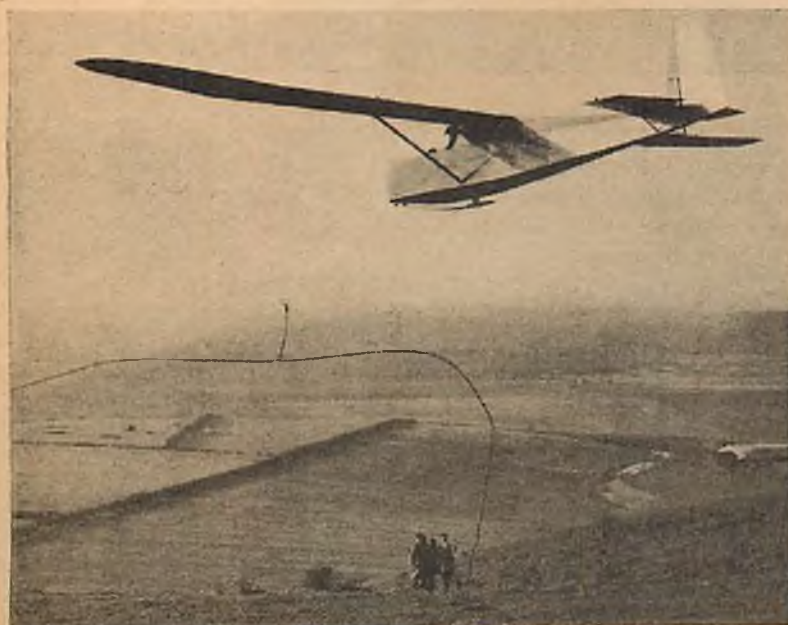
## THOSE AMAZING RUSSIANS

**I**T is amazing to watch how Soviet Russia, in less than one year, has improved her soaring technique to such an extent that at present she holds all the world distance records for single and multi-place sailplanes.

The record for a single-place ship was established in a GN-7 sailplane, which gave an excellent account of itself from the very first and has been responsible for every Soviet record in its class since then. Here are some of its performances which clearly show that this extraordinary machine, so different from our conception of high-



Herman Kursawe of the Airhoppers after gaining his "C" license with a soaring flight of 26 minutes over Wurtsboro.



A gliding lesson contained in a picture. A shock-cord launching at Dunstable Downs, England.

performance sailplane construction, may turn the tide of engineering in the soaring craft field:

August 22, 1936. Pilot Kartasheff flew the GN-7 to a distance of 426.506 kilometers (291.6 miles).

September 1, 1936. Kartasheff made a flight of 502 kilometers (313.35 miles).

September 14, 1936. Kartasheff flew a distance of 530 kilometers (331.25 miles).

May 5, 1937. Pilot Rastorguyeff established an international distance record of 539 kilometers (337 miles) from Moscow to Devitza.

May 12, 1937. Rastorguyeff flew the GN-7 a distance of 602.22 kilometers (376.38 miles).

May 27, 1937. Rastorguyeff broke the world's distance record with a flight of 652.166 kilometers (407.8 miles).

In many respects the GN-7 is similar to the Bro-V acrobatic sailplane flown last year at the Elmira contest by Jonas Pyragius. Though it differs by having a very long gliding angle and a low sinking speed, it nevertheless is characterized by an exceedingly high-wing loading, is very fast, and in general physical aspect resembles the Bro-V. It is a full cantilever gull-wing monoplane, the wing being placed so far below the center line of the fuselage that the wing tips are only a foot and a half above the ground. The fuselage is full monocoque of wood construction. The wings have two spars and are fully covered with plywood, as are the tail surfaces, which also feature cantilever construction.

Here are the figures:

Wing span . . . . .	51.8 ft.
Length . . . . .	19 ft.
Wing area . . . . .	113.5 sq. ft.
Weight empty . . . . .	583 lbs.
Fully loaded . . . . .	792 lbs.
Wing loading . . . . .	6.9 lbs. per sq. ft.
Aspect ratio . . . . .	21.6
Wing profile . . . . .	Goettingen 549
Maximum towing speed . . . . .	95 m.p.h.
Cruising speed . . . . .	65 m.p.h.
Landing speed . . . . .	43 m.p.h.
Sinking speed . . . . .	2.9 ft. per sec.
Gliding angle . . . . .	1 in 27

This information was obtained by me through the official Soviet aviation publication, the "Samolet."

Among other Russian records—some of which are also world records—the following may be cited:

August 22, 1936. Pilot Ovsyannikoff established a Soviet altitude record of 4275 meters (approximately 14,108 feet) in a BC-5 sailplane.



*About those amazing  
Russians and record-  
breaking flights made  
in their country —  
club news and notes.*

Conducted by  
Alexis Dawydoff



August 31st. Pilot Korotoff flew a distance of 335 kilometers (209.3 miles) in a seaplane glider, KAI-1.

October 21st. Pilot Ilchenko, with passenger Loginoff, made a goal flight from Sultan-Sarai Krimea to Djiploff, near the sea of Azov, 133.4 kilometers (83.25 miles), in a two-place KIM-2 glider.

May 27th. Pilot Ilchenko, with passenger Emerik, established the world's distance record for two-place sailplanes with a flight of 407 kilometers (254.25 miles) in a KIM-3 sailplane.

June 30th. Pilot Fyodoroff was towed up to an altitude of 8500 kilometers (28,050 feet) in a G-9 sailplane and after releasing, soared to a height of 12,105 meters or 39,946 feet, thus gaining 11,096 feet of altitude above release point. (Not officially recorded by the F. A. I.)

#### CLUB NEWS

At its annual election of officers the Airhoppers Glider Club of Astoria, N. Y., chose the following men: William Dolger, president; Louis Mehemel, vice-president; Arthur Ramer, secretary; John Brookhart, treasurer; and Emil Lehecka, chief instructor. The club's expansion program is now under way.

Don Stevens, taking off from the top of an auto at 60 m.p.h., dispenses with tow lines and winches.

A membership drive has been instituted, purchase of a high-performance ship is being discussed and a series of lectures on the operation of gliders and sailplanes, as well as on meteorology and soaring flight, are to be given as soon as a suitable hall for this purpose can be located.

We spent a pleasant few hours recently with Paul and Ernest Schweizer at their place in Peekskill, N. Y., where the Schweizer all-metal utilities are built. As a workshop the boys use the barn behind their house (which is the famous Bonnie Brook Inn), and have

equipped it with every kind of machinery to stamp out and construct glider parts. There you'll find jigs, lathes, drop hammers, cutting and punching tools, smelting furnace. No wonder their small all-metal utility was built in seven weeks, engineering included! In addition to their construction work, Paul and Ernest play active rôles in the Hudson Valley Gliding and Soaring Club, which they organized.

Dick Randolph of Akron has purchased a Westpreussen high-performance sailplane, which (Turn to page 82)



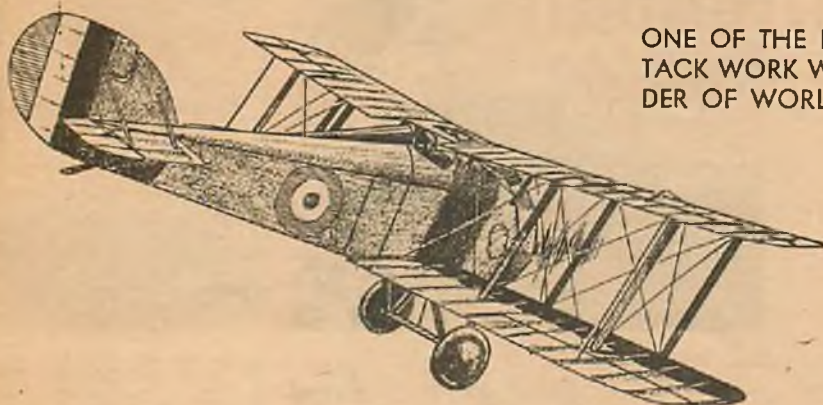
Above—Airhoppers Club members with Lehecka's Rhonsperber, Alexis Dawydoff, extreme right.

Below—Left, Lehecka's Rhonsperber; right, Chet Decker's Albatross.



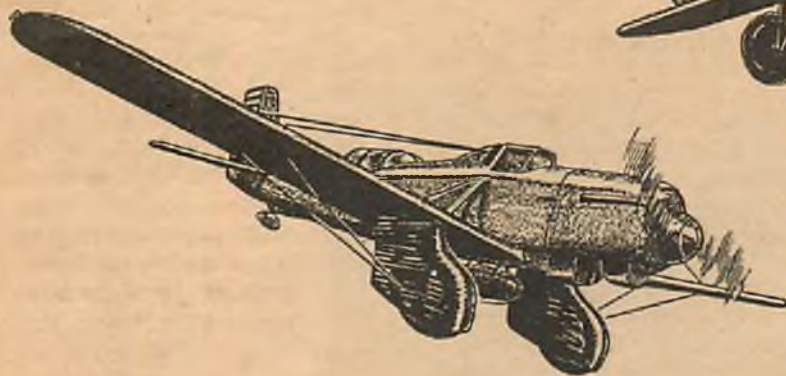
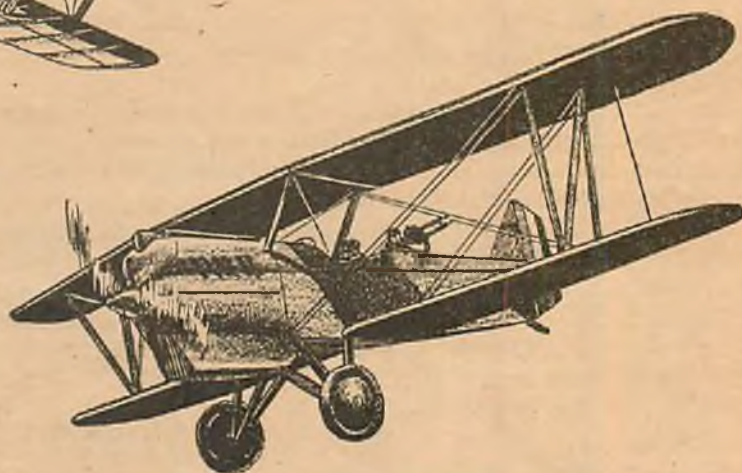


# DEVELOPMENT OF ATTACK PLANES



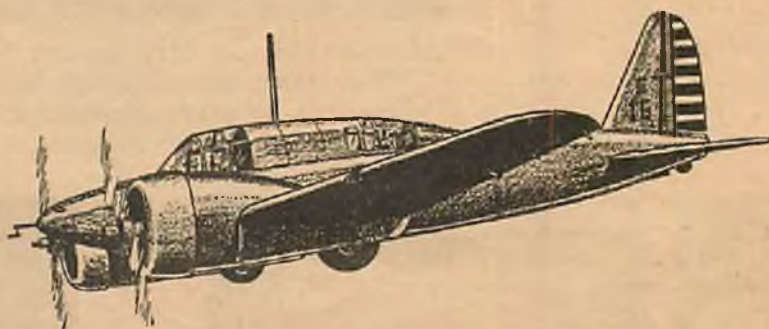
ONE OF THE EARLIEST PLANES DESIGNED FOR ATTACK WORK WAS THE BRITISH SOPWITH SALAMANDER OF WORLD WAR FAME. THIS SINGLE-SEATER BIPLANE, EQUIPPED WITH TWO MACHINE GUNS AND PROTECTIVE ARMOR IN THE COCKPIT, COULD CLIMB TO 10,000 FT. IN 17 MIN. AND HAD A SPEED LOW DOWN OF APPROXIMATELY 125 M.P.H.

A LATER ATTACK PLANE, STANDARD FOR THE ARMY FOR MANY YEARS, WAS THE FAMOUS CURTISS "FALCON" OF 1925. THIS TWO-SEATER WAS EQUIPPED WITH A 30 CAL. GUN FIRING FORWARD AND TWO 30 CAL. GUNS ON A RING MOUNT IN THE REAR COCKPIT. A SPEED OF 158 M.P.H. AND A 20,000 FT. CEILING MADE THIS A FORMIDABLE SHIP.



IN 1932 BEGAN THE SWING TO MONOPLANES FOR ATTACK AVIATION WITH THE CURTISS A-8 "SHRIKE." THIS PLANE, WITH A CEILING OF OVER 21,000 FEET AND A SPEED OF 200 M.P.H., CARRIED 4 FIXED MACHINE GUNS AND 1 FLEXIBLE GUN IN THE REAR COCKPIT. THE "SHRIKE" WAS ALSO EQUIPPED TO CARRY 488 LBS. OF BOMBS.

THE PRESENT VERSION OF AN ATTACK SHIP IS PERSONIFIED BY THE CURTISS Y1A-18 TWIN ENGINE MIDWING MONOPLANE. THIS SHIP IS POWERED WITH TWO WRIGHT CYCLONE ENGINES AND IS REPUTED TO HAVE A SPEED OF WELL OVER 300 M.P.H. FIVE MACHINE GUNS, FOUR FORWARD AND ONE AFT IN THE REAR COCKPIT, MAKE THIS NEWEST THREAT IN AN ATTACK SHIP THE LAST WORD IN THIS CLASS OF AIR ARMAMENT. THIS SHIP HAS THE REPUTATION OF BEING THE FASTEST TWIN ENGINED PLANE IN THE ARMY SERVICE, AS WELL AS ONE OF THE MOST EFFECTIVE FOR THE PURPOSE DESIGNED.





# 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: I would like to get blue prints and detailed plans on the British "Topsy" light plane. Can you suggest where I might obtain these? G. S. Benwood, West Virginia.*

*Answer: I can only suggest that you write direct to the Topsy Aircraft Co. Ltd., London Air Park, Hanworth, Middlesex, England, and see if they would sell you a set.*

*Question: Is the Sir Malcolm Campbell who did new speed records on the Utah Salt Flats last year the same man who recently set up a new motorboat speed record? I understood he was killed in England some time ago. H. A. C.*

*Answer: No. Sir Malcolm Campbell is still alive. You are confusing him with Sir Henry Seagrave, another British speed star, who used to drive a speed car at Daytona Beach.*

*Question: Why don't the British change the Supermarine S6b into a land plane? It would be much faster. What is the rated horsepower of the Rolls Royce Kestrel and what is the highest-rated American aircraft engine? A. B., Halifax, Nova Scotia.*

*Answer: There is a question whether changing the Supermarine racer into a land plane would increase its speed a great deal. But that is not the important point. Considering the landing speed of the Supermarine, it is not likely that it could be landed on any ordinary field, which is one of the reasons the Schneider Cup racers were seaplanes. By that I mean that until land planes can be designed so that they can obtain a much lower landing speed, they will never reach the racing speed of seaplanes. A seaplane has plenty of room to get down on a large lake or bay, but land planes are usually confined to a relatively small area. I believe that the Supermarine racers landed at something like 110 m.p.h. The highest-*

*rated Rolls Royce Kestrel turns out 690 h.p. The new Merlin turns out 1,050 h.p. The Pratt & Whitney Twin Hornet has a h.p. rating of something like 1,450 h.p.*

*Question: To simplify the task of learning to fly, would it be helpful to include a device that would automatically bank the plane to the correct degree when the rudder pedal was depressed? For instance, if the right rudder was pressed for a 45-degree turn, the ship would automatically do a right bank to the proper degree to prevent slipping, thus doing away with the stick except for climbing and diving. O. V. N., Portland, Oregon.*

*Answer: In theory, this idea is all right until you attempt any maneuver in a dive or a climb. Then your device would not work out so well. You see, one must learn to fly correctly, using the correct controls—right from the start—or he never becomes a good pilot. While our airliners have robot devices, they work first to keep the plane in level flight and on a stated course. The robot is not cut in until a prearranged flight height is reached. Your idea has been tried out, but it has not been proven suitable for safe flight. All three controls must work independently in an emergency.*

*Question: What is the weight and displacement of the Menasco C-4 and the Isotta-Fraschini 6-cylinder, air-cooled engine of 250 h.p.? W. J. N., Acton, Ontario.*

*Answer: The Menasco C-4 "Pirate" weighs 293 lbs. dry, without hub or starter. It has a total displacement of 363 cubic inches. I do not have any record of a 250 h.p., air-cooled Isotta-Fraschini. But they used to put out a 100-120 h.p. motor which weighed 230 lbs. and had a bore of 100mm. and a stroke of 140mm. That's the best I can do for you.*

*Question: Has the United States an airplane equal in maneuverability and speed to the British Supermarine Spitfire? C. G., Ottawa, Canada.*

*Answer: This question is impossible to answer. We do not know the actual speed of the Supermarine Spitfire and as I have never flown one, I have no idea as to its maneuverability. However, from general observation, I would say that the American Seversky P-35 comes as close to it as any ship in this country. Both are particularly fine ships of their type.*

*Question: Would it be possible for me to get into the Naval Air Reserve if I have flat feet? B. S.*

*Answer: I would say not. But as I am not a medical authority, I would first suggest that you take a medical examination at a Naval recruiting station. This is the answer I would give to any question involving physical qualifications.*

*Question: What subjects would you suggest that I take in high school presuming that I wished to enter aviation as a transport pilot? R. T. W., Millisford, Massachusetts.*

*Answer: By all means take mathematics as far as you can go. Then include chemistry, mechanical drawing, science, and advanced physics and geography. History will do you no particular harm either.*

*Question: How much weight will one cubic foot of helium lift? Why don't seaplanes have retractable pontoons? What is the size of a Pratt & Whitney supercharged Twin Wasp, its dry weight and r.p.m.?*

*Answer: Your helium question is too much for me. I can only tell you that helium has a density of 0.1368, air-1, whereas hydrogen is rated at 0.0696, air-1. Perhaps you can work that out, if you are really interested. Seaplane*

(Continued on page 87)

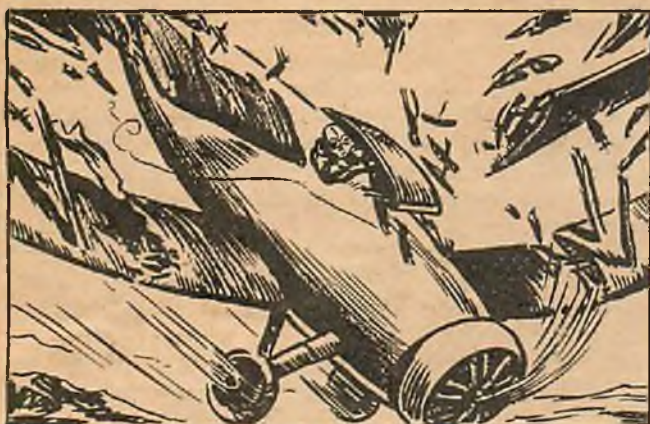


# SPLIT-SECOND ACTION

*Hair-breadth escapes, hair-trigger decisions, dangerous moments that come once in a lifetime.*



MATT BERRY LANDED HIS PLANE IN A RAGING GALE BY THE FLARE OF NORTHERN LIGHTS TO RESCUE TEN STARVED, FROZEN TRAVELERS SHIPWRECKED ON THE ARCTIC SHORE. HE HAD TO WAIT A WEEK UNTIL HE COULD TAKE OFF AND EVEN THEN HAD TO HEAT THE MOTOR OIL WITH A BLOW TORCH. ON ARRIVING AT HIS DESTINATION HE HAD FIVE MINUTES' SUPPLY OF GASOLINE LEFT!



LIEUT. S. A. McCLELLAN OF THE U.S. MARINE CORPS WAS POWER DIVING AN EXPERIMENTAL PURSUIT PLANE - SUDDENLY THE WINGS AND TAIL RIPPED OFF AND THE CENTER SECTION OF THE WING FOLDED OVER THE COCKPIT. PUSHING UPWARD THE PILOT FREED HIMSELF AND "BAILED OUT" ONLY TO LAND AMID ICE FLOES IN THE ANACOSTIA RIVER.



WHEN A PANIC-STRICKEN STUDENT "FROZE" TO THE CONTROLS AND HEADED THE PLANE TO A CERTAIN CRACK-UP, MISS ANNETTE GIPSON, THE INSTRUCTOR, SAVED BOTH THEIR LIVES WITH A FIRE EXTINGUISHER. SHE HIT THE STUDENT ON THE HEAD WITH IT UNTIL HE SAW THE LIGHT AND LET GO THE STICK. THE LANDING WAS AFFECTED SAFELY.



E. G. MARQUIS WAS ONLY 900 FEET UP WHEN THE PROPELLER FLEW OFF HIS PLANE AND BURIED ITSELF IN THE LEFT WING. HE BROUGHT THE PLANE DOWN TO A PERFECT LANDING ALONGSIDE A MINEOLA, L.I. STREET AND ONLY A FEW YARDS FROM A FUNERAL PARLOR.



GENE AUSTIN, FOR A MOVIE STUNT, PLACED A BOMB, WITH A FUSE REACHING TO THE COCKPIT, IN THE GAS TANK OF AN OLD PLANE. ON SIGNAL FROM THE CAMERA MEN HE WAS TO LIGHT THE FUSE AND BAIL OUT. THE SIGNAL FLASHED AND AUSTIN LIT THE FUSE - BUT BEFORE HE COULD LEAVE, THE PLANE THE BOMB EXPLODED. MIRACULOUSLY HE ESCAPED SERIOUS INJURY.



# The Air Trails Gallery



Above—The Curtiss P-37 is the new experimental version of the P-35—210 of which were contracted for. Note the refinement of cooling and exhaust arrangements for the 1,000 h.p. liquid-cooled Allison.

Below—Al Williams' Gulfhawk, used by him for exhibitional flying, is similar to the latest navy Grummans. Powered by the 1,200 h.p. Cyclone, the Gulfhawk is said to hit 300 m.p.h. Flare holders beneath wings.



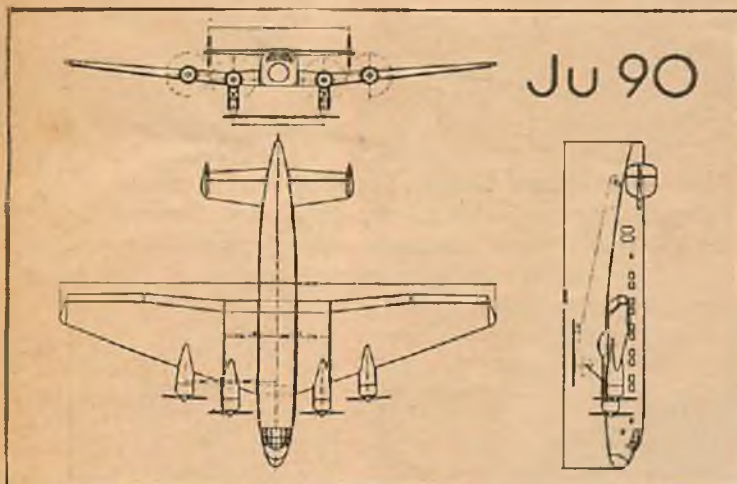


# Germany's GIANT Airliner

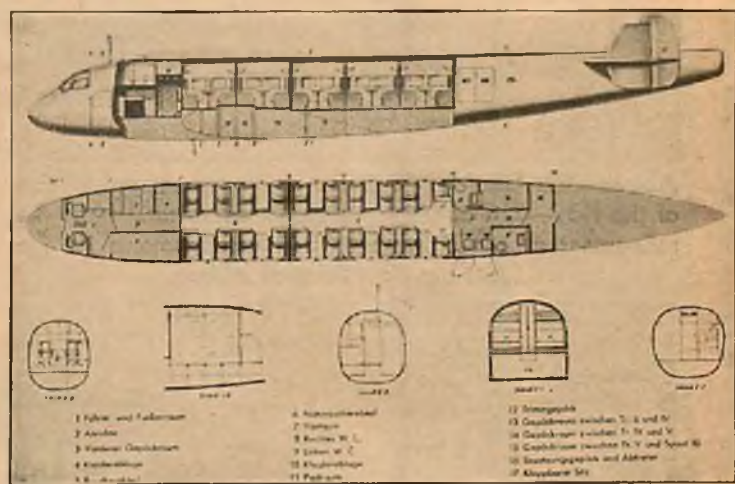
About the Junkers 90, a 21-ton, 40-passenger, 256 m.p.h. transport—the current sensation in European aviation.



Left—A tractor trundles the Goliath of the airways onto the field for its first test flights. The structure of the ship is entirely of metal. Right—Curious onlookers peer into the retracting landing gear's cavities and upward at the great wings.



The three-view plan of the Junkers reveals the interesting design. The plane is distinguished by its sharply swept-back wings and by the unusual position of the tail assembly.



A cutaway drawing, showing the internal disposition of the seating and cargo compartments. The girth of the cabin is sufficient to permit four rows of seats.

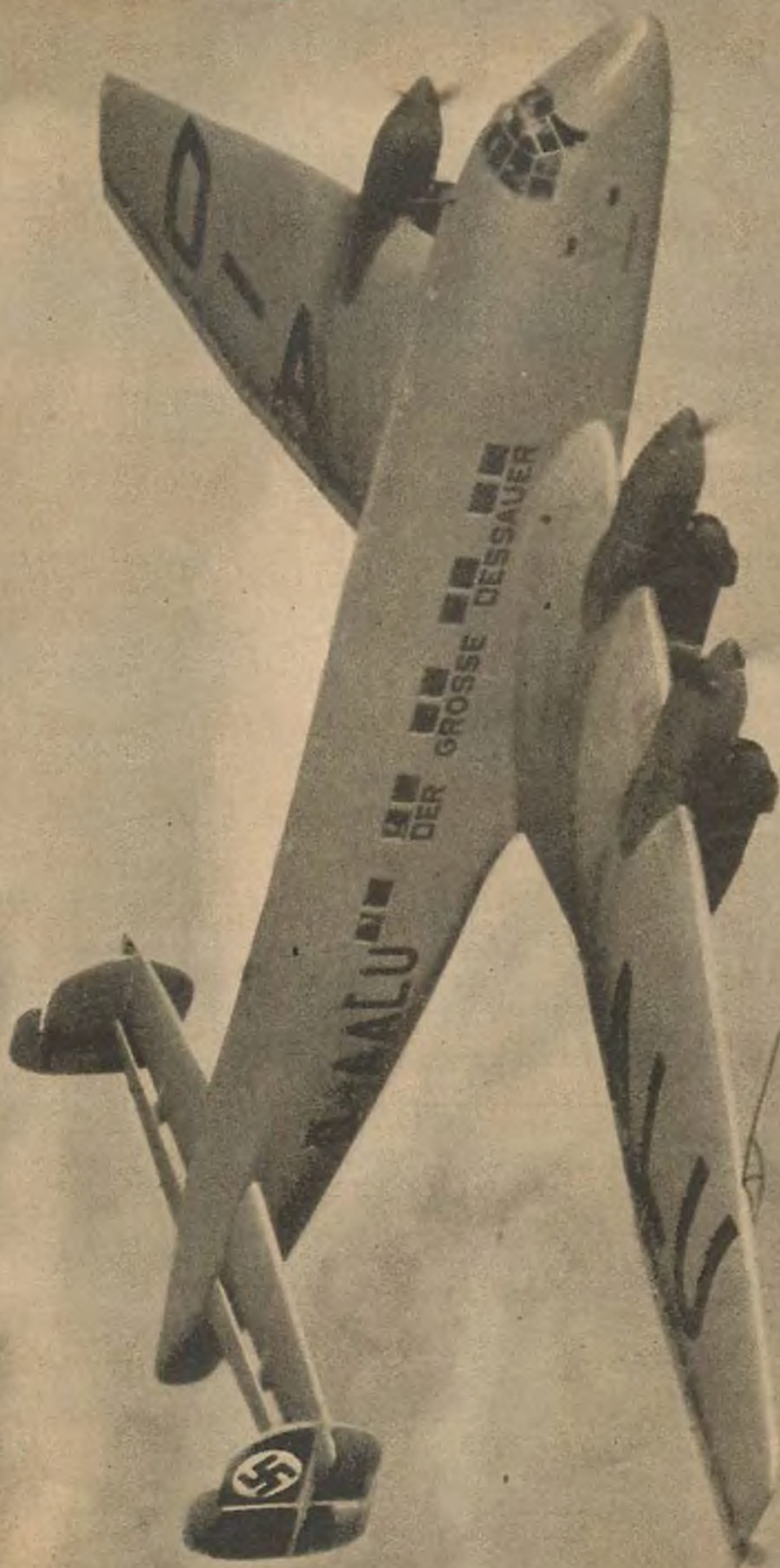


Left—This picture of the unfinished cabin illustrates the spaciousness of the ship. The passenger compartment measures 34 feet 6 inches; its width, 9 feet 9 inches. Right—The passenger compartments are the equal of the finest rail service.



Right—Her four 1,100 h.p. Junkers Jumo diesels droning steadily, the "90" rides above the clouds. Stressing safety, the ship can operate on three engines with no perceptible loss in performance. Despite the loaded weight of 46,000 pounds, the "90" cruises about 1,250 miles and lands at less than 60 m.p.h.





AIR TRAILS GALLERY—Flight picture of the Ju-90, as described on the opposite page.



# AIR ADVENTURERS

## The Honor Roll For March

### FLIGHT CAPTAINS

H. S. Bourgoin, St. Louis, Mo.  
Murray Dobier, Ottawa, Ont., Can.  
Jack Lougheed, Detroit, Mich.

### FLIGHT LIEUTENANTS

Bob McCourt, Englewood, Col.  
Murray Donovan, St. John, N. B., Can.  
Thomas Bamford, Washington, D. C.  
Jerry Baer, Madison, Wis.  
Ernie Gray, Starbuck, Man., Can.  
Howard Busch, Jamaica, N. Y.  
Marcel Marier, Montreal, Que., Can.  
Elizabeth Saur, San Francisco, Cal.  
James Sable, Osage, Wyo.

### ENGINE MECHANICS

Nita Simpson, New York City

C. Wrobel, Chicago, Ill.  
Arthur J. Kostaras, Lowell, Mass.  
Reg McKinlay, Cobourg, Ont., Can.  
Jack R. Harvey, Winnipeg, Man., Can.

### TOPOGRAPHERS

Aldian LaSalla, San Bernardino, Cal.  
Bob Rudolph, Morris Plains, N. J.  
Eugene Hackett, Chicago, Ill.  
William H. Robey, D. O., Sullivan, Mo.  
George P. Weigart, Mountain View, Ark.

### PHOTOGRAPHERS

Dan Lynch, Haverhill, Mass.  
Gordon Biederman, Pembroke, Ont., Can.  
Ed Allen, Lompoc, Cal.  
Anthony Lenac, Ottawa, Ill.

Bob Meiborg, Elmhurst, Ill.  
Ray Houchins, San Mateo, Cal.  
John E. Wolfe, Buffalo, N. Y.  
Albert H. Meryman, Winthrop, Mass.

### AIRPLANE MECHANICS

Raymond Fowler, Jr., Waterbury, Conn.  
Oliver L. Davidson, Jr., Baltimore, Md.  
Jack Wilson, Mt. Hamilton, Ont., Can.  
Daniel Kelly, West Somerville, Mass.

### OBSERVERS

Clyde Wallace, Madison, Ind.  
David Thompson, Orlando, Fla.  
Jack Miller, Baxter, Kan.  
Joe Gatewood, Moline, Ill.  
Douglas Robertson, Halifax, N. S., Can.  
H. Warren Willhoite, Portland, Ore.

## Whether or Not We Fly—

### GREETINGS, Air Adventurers!

There's a lot of work ahead in this aviation business, whether you fly or not. This thought came to me when I read F. Orlin Tremaine's introduction in our annual, "Air Progress," which is now on the news stands.

He said: "Whether or not we fly, every one is interested in the progress of man-made wings."

I read that over several times, for it had a catchy rhythm, a cadence that continued to jingle through my mind. Then suddenly it dawned on me that in that one sentence was a new unwritten law for Air Adventurers.

I realized that out of the thousands of members we have on our rolls, hundreds of them, for various reasons, will never be able to fly—that is, to actually pilot their own plane. It may be a matter of finances, physical disability or the fact that one may be miles from an airport and the opportunity of getting aviation instruction.

Air Adventurers have pledged themselves to further the advance of aviation and whether or not

they fly, there are still hundreds of opportunities for them to play a big part in the progress of the greatest science man has ever studied.

Whether or not you fly, there are still hundreds of problems for you to help us solve. Air transport to-day has reached a high point of efficiency, but we are still far from the peak. There are many things we need to know and the man who can sit down and figure them out, beyond the romantic circle of piloting, is the man who may do more for aviation in the next twenty-five years than all the pilots put together.

Did you know that one of America's greatest aeronautical designers has never been up in one of his own transports? Did you know that the man who has designed some of the finest racing planes the world has ever seen does not even own a private or amateur pilot's ticket? Do you realize that most of the greatest technical advances made in planes and motors have been contributed by men who were not pilots—men who seldom stepped into a plane?

*We deeply regret that the lack of space prohibits the use of more of the splendid photographs submitted by other Air Adventurers. I wish to thank all those whose photos were omitted, but nevertheless worthy of mention as splendid examples of the alertness of our members to aviation.—Albert J. Carlson.*



An unusual photo of the chemical tanks used by the Northrop Attack planes. Picture by Eugene Legler, Austin, Texas.



We need many highly skilled transport pilots and many daring test pilots. We need men of vision in our air services and conscientious instructors in our schools. But we also need more men of imagination before our drawing boards and in our technical bureaus.

From all sides the cry comes: "We want more efficient airfoil data. We must defeat fog. We must have more reliable engines and new and safer fuels. We cannot go ahead until we have defeated icing conditions."

If you want actual facts, just look over your daily newspaper and read it thoroughly. Accidents take place which could be averted. Brave men die because we have failed to provide certain safety equipment. A man who has never flown has just mixed a chemical paste in England, which when spread on the leading edges of wings, struts, fins and other surfaces, immediately breaks up all forms of icing conditions. If he can develop it so that it can be applied to the blades of propellers, he will not only have given aviation a great weapon, but will have made a fortune.

Wouldn't it be a touch of irony to find that, after all these years of our spending thousands of dollars to build elaborate de-icing equipment, some one should come along and with a simple chemical mixture solve the problem completely? But that is the way with invention. The most simple devices are usually the most effective.

Some day, some one is going to find a new, cheaper and more efficient variable-pitch propeller. There's a wide open door where our control systems are concerned. We could use a new type engine—one that will conform more closely to our recognized streamline requirements.

Whether or not you fly, you can still do your bit toward the progress of aviation.

Can you devise a more simple retractable landing gear? Have you any ideas for a more simplified system of air navigation? Can you tell us how to build planes with interchangeable parts?

I know a youth who works in a gasoline filling station. He won't be there long. He had a motorcycle and was sick of looking at a particularly dirty piece of aluminum on it, so he did something about it with a three-dollar chemical set. Every air line in this country and several abroad want that cleaner he mixed. He has never flown and now he can do as he wishes about it.

Every month I get dozens of letters from readers who have ideas. They tell me about them and send in rough drawings or general explanations. Many of them seem to have much merit, and I do my best to give them what advice I can. But, unfortunately, as far as I can see, this is usually as far as it goes. If I do not tell them the idea is sound and a certain money-maker, they quit on me. If I cannot tell them where to get financial assistance or a personal introduction to Donald Douglas or Eddie Rickenbacker, they chuck the lot in the basket.



Spartan Executive, by George Goodhead, Tulsa, Oklahoma.

Whether or not you fly, the aviation world is wide open for you. You've got to keep pitching, however. We want our Air Adventurers to remember this one point. If you've got something, keep after it. If you know some one who has something, get after him and get him to fill out our application coupon and join us. All we need is ten cents, a signed coupon and we'll do

our best to give him the best—so keep pitching, Air Adventurers, keep pitching.

Whether or not you fly, you still have a Creed to live up to.

Your Flight Commander, ALBERT J. CARLSON.



Above—Lockheed Electra, by Edward C. Bjurling, Bridgeport, Connecticut. Left—Two of the four wing machine guns of a Northrop Attack. Photo by Eugene Legler.

#### AIR ADVENTURERS NEWS.

The mail has been heavy during the past week or so and we are glad to report that the quality of the material, including photographs, has improved considerably.

We can't wait to tell you about the photos Eugene Legler of Austin, Texas, has sent us. Eugene was fortunate enough to get to Barksdale Field in Shreveport when the 8th and 90th Attack Squadrons were there. He managed to get two particularly interesting shots. One was a close-up of two .30-caliber machine guns in the wing section of an A-17-A attack ship (Turn to page 81)

#### (MEMBERSHIP COUPON)

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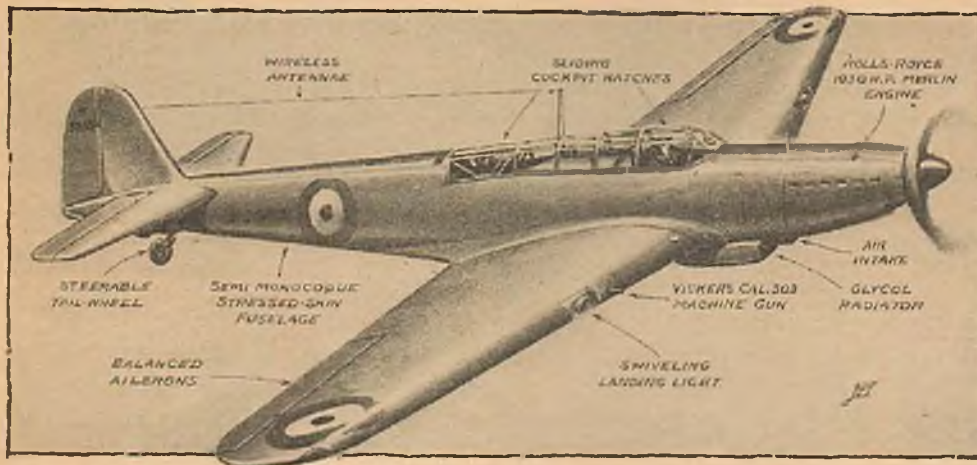
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☐ Check here if interested in model building.

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



# R.A.F.'s New Light Bomber



By  
Frank  
Tinsley

BRITAIN'S amazing rearmament program proceeds apace. Guns, ammunition, bombs and gas masks are pouring at a prodigious rate from factories geared to war-time production schedules. Grim, gray, floating fortresses slip down the ways to reinforce Britannia's naval might. Fast new tanks, both large and small, clank noisily off assembly lines. Sleek, murderous anti-aircraft guns are set up in strategic positions for the aerial defense of the tight little isle.

The English army, long steeped in the tradition of mass and class, is being shaken to its foundations by the radical reorganization policies of terrierlike Leslie Hore-Belisha, the crown's new War Secretary. The army, however, is still having trouble obtaining sufficient able-bodied recruits and is said to be short approximately 1,000 officers and 12,000 men. Belisha is meeting the situation in various ways. Army life is being made more attractive for enlisted men by extra meals, higher pay, more time off, etc. The formerly aristocratic officer caste of the peacetime establishment is being opened to all classes of the population as it was during the World War. It is hoped that this democratic step, plus promotion by merit and an increase in pay, will soon fill the vacancies. Perhaps the most revolutionary move of all is Belisha's revitalization of the Army Council and General Staff by replacing elderly "brass hats" with younger, more adaptable officers. The average age has already been reduced from 63 to 52.

The navy, too, has come in for its share of shaking up. The unfortunate contretemps in the Mediterranean several years ago deeply shocked the English people. That the great fleet of the vaunted "Mistress of the Seas" should turn tail before the flying squadrons of Mussolini was as bitter a pill as British pride has ever been forced to swallow. Profiting by the lesson, however, the Admiralty has been closely studying the problem of aerial defense for warships. As a result, the fleet air arm has received a considerable reinforcement in both men and machines and the anti-aircraft batteries of surface naval vessels have been vastly improved. A number of new weapons have been developed for the purpose, including formidable multiple mountings of machine guns and small cannon. The latter have proven very successful. They consist of a number of automatic cannons fastened in a shielded frame and served by a single gun-crew.

Christened by the sailors "Chicago Planos," they fire a tremendous volume of explosive shells at low-flying aircraft.

A greater proportion of the rearmament funds have been allotted to the task of rehabilitating a sadly neglected air force. Under the domination of a more or less unsympathetic army command, the Royal Air Force was relegated to the status of a minor army auxiliary. Starved for funds, the R. A. F. became progressively weaker in both men and ships. Only the thorough training of the pilots and the high degree of efficiency of the aircraft provided, saved the air force from deteriorating into a hollow shell of its wartime might.

Scattered in relatively small detachments throughout the empire, quick mobilization of the Royal Air Force was virtually impossible. Despite repeated warnings by military critics, the British public remained uninterested and the war office, jealous of the popularity of the aerial arm, did everything possible to subordinate it to the older services. It seemed as if nothing short of a sudden war would serve to shock John Bull out of his apathy.

Mussolini kindly provided the shock when he practically ordered the British navy out of the Mediterranean. Threatened with a mass attack by Rome's flying legions and motorboat torpedo flotillas, England's admirals suddenly developed a disinclination to test their oft-stated belief that no airplane could sink a battleship. The fleet withdrew!

The awakening was rude and sudden. Top-hatted Londoners and grimy mechanics from the Clyde looked up for the first time since the War and surveyed the very real menaces that surrounded their island kingdom. They found Britannia confronted by a powerful and bellicose Italy, captained by the most resolute and able dictator of modern times. They discovered their most important

*The Battle, Jr., a deadly miniature of the famed Fairey Battle, roars across our cover on a mission of Mars.*



single trade route, the famous "life line of the Empire," dominated by Italian air fleets based on strategically situated island airdromes. They learned that the vast aerial armada of their French ally was almost entirely obsolete. Most frightening of all was the sight of a large, new and efficient Nazi air force based within a few hours' flying time of Britain's business and industrial centers.

Englishmen may well thank Mussolini for tying that rude knot in the sleeping lion's tail. An aroused public opinion, quickly reflected by parliament, has resulted in the greatest rearmament program in history. The six-billion-dollar defense fund has given pause to the dictators. Well they realize that they can never match England's wealth in an out-and-out arms race. Already, Germany has pulled in her Aryan horns. Mussolini concealed his concern by blustering demands for guarantees that Britannia's new sword is not aimed at Italy. John Bull, ignoring the clamor, plows doggedly ahead, forging a terrible weapon which paradoxically is doing more to promote world peace than all the pacifistic yammering since the World War.

The frenzied rush to expand Britain's armed forces has uncovered one interesting fact. The Royal Air Force has become far and away the most popular of all the King's services. While the older branches try vainly to wheedle more recruits, the pick of England's youth streams steadily into the flying service. The home defense force has been raised from a handful of machines to a strength of 123 squadrons with a total of 1,750 first-line planes. This places Britain on a numerical par with any of her potential enemies. Vastly more important than that, however, is the extraordinary quality of her new wings. Military effectiveness in the air is largely determined by speed and load-carrying ability. Higher speeds without too great an increase in fuel consumption permit longer operating ranges with no sacrifice in military load.

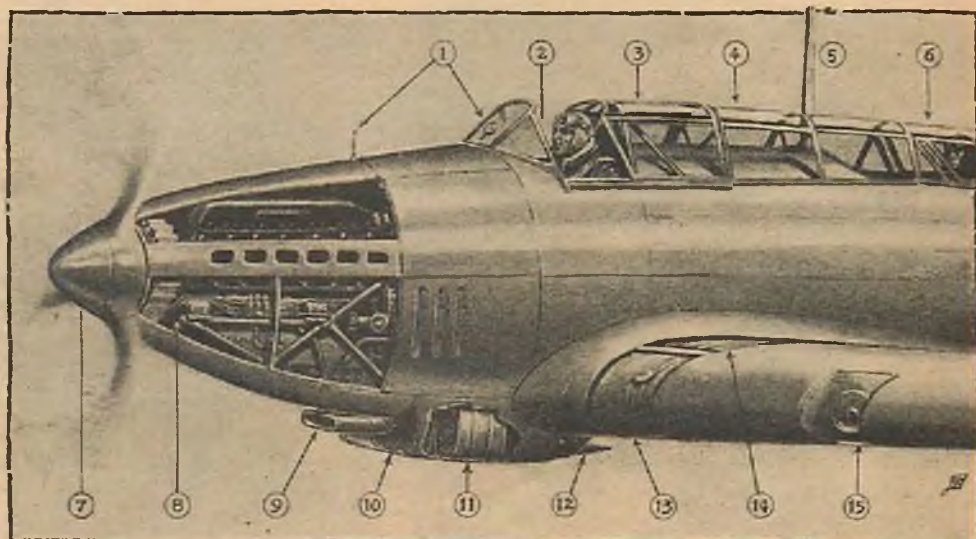
A perfect example of this is the Bristol "Blenheim" medium bomber. This new twin-motored monoplane, said to be copied from our own Lockheed transport, is the fastest bomber in the R. A. F., being credited with a maximum speed of around 280 m.p.h. The take-off and climb of the machine is sensational. It leaves the ground after a run of only 300 yards in 15 seconds. It has an initial rate of climb of 2,000 feet per minute, reaching 5,000 feet in less than 3 minutes and 10,000 feet in 5.5 minutes. This is with a full military load. Remember, too, that the "Blenheim" is a big ship with a span of over 56 feet and a gross weight of 12,000 lbs. Rated as a medium bomber, this remarkable plane is faster than most pursuit jobs and carries as heavy a load as the average old-time heavy bomber.

Another medium bomber of phenomenal performance is the Fairey "Battle." This all-metal, low-wing monoplane is

one of the models selected for mass production not only in the Fairey Company's works at Stockport, but also in the great "shadow factory" of the Austin automobile company. She is an unusually clean piece of design, featuring retractable landing gear and bomb racks, split-edge flaps and stressed-skin construction. Carrying a crew of three, the "Battle" climbs to 15,000 feet in 13 minutes, 36 seconds—where a maximum speed of 257 m.p.h. is attained. Cruising at 200 m.p.h. at an altitude of 16,000 feet, the ship has a range of 1,000 miles. The "Battle" has a service ceiling of approximately 26,000 feet and lands at 60 m.p.h. Her normal gross weight is nearly 11,000 pounds.

Not content with this triumph, the Fairey engineers have now produced a light bomber of almost identical lines and superior performance. This smaller edition of the "Battle," pictured on the cover of this issue, has been designated as a light bomber and given the design number P.4/34. Like her older sister, she is powered with the new Rolls-Royce "Merlin II" chemically cooled engine. This compact and powerful motor is a further development of the famous "Kestrel" and is now a standard R. A. F. power plant around which many new fighter and bomber models are being designed. The "Merlin" has been flown over 2,000 hours and, under exacting tests, has shown a marked superiority over the "Kestrel." This is particularly noticeable in the new motor's resistance to harsh treatment.

The "Merlin" is produced in two models. The chief difference lies in the cylinder-head design. Number one has detachable cylinder heads of the "Ramp" type, whereas the later model features a more rigid construction with blocks and heads cast in a unit. Both are 12-cylinder V-type jobs of the standard Rolls-Royce pattern. The cylinders are arranged in two banks set at an angle of 60 degrees. The "Merlin II" blocks are cast in aluminum alloy and fitted with "wet" steel liners. Four valves are provided for each cylinder, each with two concentric return rings. The exhaust valves on the outside of the head are of the sodium-cooled type. (Turn to page 90)



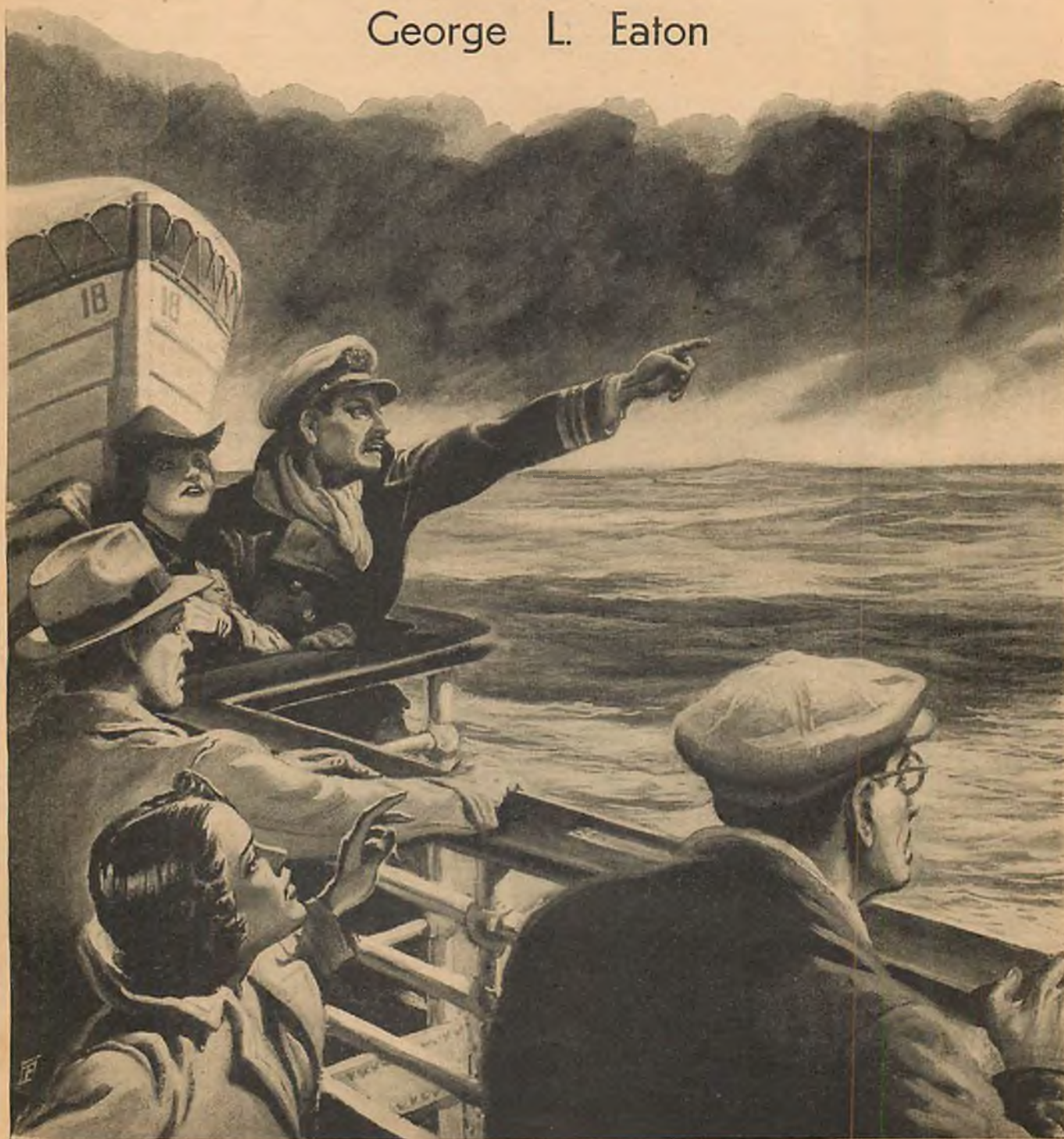
Cut-away view of the new ship showing details of construction: 1—machine gun sights; 2—sliding hatch covers pilot's cockpit; 3—crash-guard; 4—fixed center sections of enclosure; 5—radio mast; 6—gunner's cockpit with tilting hatch; 7—three-bladed propeller; 8—1,030 h.p. chemically cooled Rolls-Royce Merlin engine; 9—air intake; 10—main radiator; 11—oil cooler; 12—air-control flap; 13—oil tank; 14—fuel tank; 15—swiveling landing light.



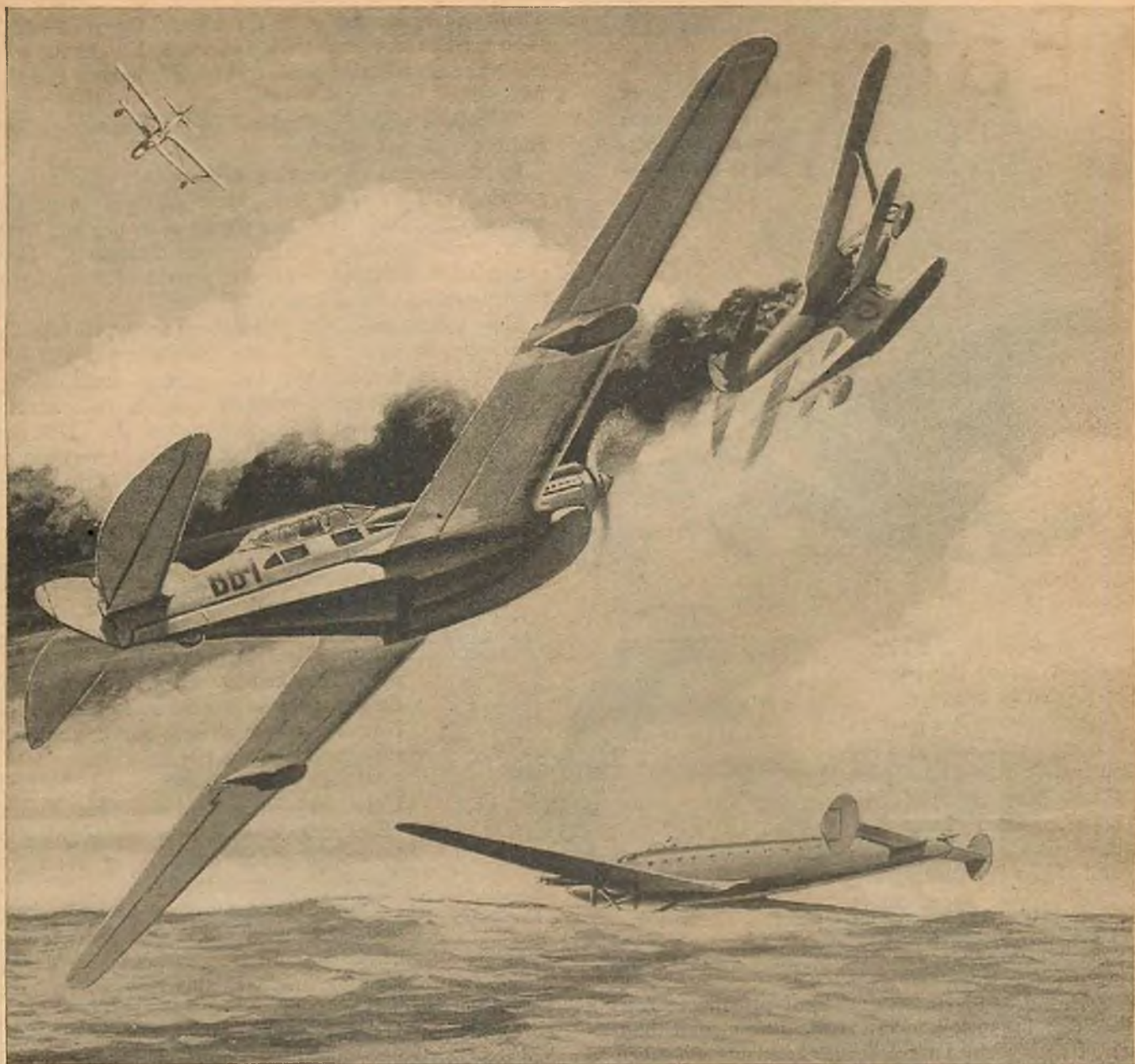
# Earmarked Gold

*A golden decoy turns against its master to right a vicious wrong.*

By  
George L. Eaton







The ship became a ball of smoke streaked with orange flame——

THE predaceous, lined faces of the two men who sat in that sumptuously furnished suite on the nineteenth floor of the Throckmorton Hotel, gazing out over San Francisco Bay, were not happy ones. Rather, their state of mind added to their naturally pernicious expressions.

It is doubtful that, even had they tried, they could have looked happy. Their faces were not built for it. That agency of Providence who designs the contours and lines of the human race must not be without a sense of humor, for in some beings he places a heart of gold and then forces them to wear the mask of an ogre to hide it from the world. On others, to complete the paradox, he bestows the soul of the devil and the face of a madonna.

But he had not been laughing when he made the mold from which those two were cast. Their faces were evil and they were evil. He had given the world a break by stamping them with faces that advertised the black viciousness of which they were a whole. They had faces that one could long remember.

That was one of the reasons those two were now hiding within the comparative security of a luxurious San Francisco hotel instead of frequenting the warmer night clubs along New York's Broadway for which they lived.

The likenesses of "Ugly" Barillo and "Lippy" Freeman were posted in a conspicuous place in a thousand and one post offices throughout the country. The attorney general of the United States had invoked a seldom-used authority in posting them as fugitives when they jumped their bail after being sentenced to two years in jail in an anti-trust case. They were fugitives from justice under a half dozen other indictments involving industrial racketeering in New York City. The special prosecutor had charged that Barillo and Freeman enforced the demands of "Slip" Ogden, their "higher-up," by every form of violence and intimidation known to racketeering. They were experts at their trade. They could hijack a truck, throw a bomb, slash tires, throw acid, burn factories and cut throats with the same aplomb the average man can butter a slice of toast.

When a special prosecutor had been appointed in New



His bullets wove  
a pattern from  
the engine hous-  
ing to the tail—



York to clean up the city, they had joined the suave Slip Ogden in laughter.

"Lemme bump this punk an' get it over with," Lippy Freeman had said to Slip Ogden.

"Let him alone!" Slip snapped. "He'll hang himself."

But after a few months they began to be apprehensive. This special prosecutor didn't work the way of all others. They planted spies and stool pigeons, but they couldn't get any information. After a while they began to notice that the little men at the bottom of their rackets were being picked up and taken to the special prosecutor's "singing school." They sang their story to the prosecutor and were then held as witnesses and given protection from the revenge of Slip Ogden's strong-arm men. Then the next men up the ladder were picked up to sing their song to the prosecutor's men.

Finally they swooped down on Slip Ogden and thirty of the higher-ups who ran his rackets. The special prosecutor got indictments, but Slip, Ugly and Lippy were still laughing—only Ugly wasn't laughing so loudly now.

"Maybe this punk is goin' to get us," he said to Lippy.

"Lissen!" Lippy said. "Slip is short for slippery. He's the slickest mouthpiece that ever chipped ice under a prosecutor's dogs. He'll put this punk on the skids with a one-way ride."

The next day Slip Ogden said to his two head men, "Boys, we're going west to get out of this damp, winter climate."

"We're goin' to jump our bail?" Ugly asked, his eyes wide.

"Unless you want to go to Dannemora," Slip said, evenly. "This boy has us tagged. We'll get out and stay out until he's out of office and we can adjust things.

There will be an election in the fall and then this—this"—he tried to find expletives that would best fit the special prosecutor—"this punk will be out and we can slip back."

"Slip back with Slip Ogden," Lippy Freeman cracked and got a vicious glance.

By the means of wearing tortoise-shell glasses and growing hair on their faces, they managed to get by without detection. They had plenty of money and lived in an atmosphere of luxury that was disarming. They pretended to be importers and exporters of various and sundry articles to and from the Orient.

Slip Ogden carried the pretense off very well because, outwardly, he was a gentleman. He dressed well and forced Ugly and Lippy to dress quietly. He spoke excellent English and was soft-spoken and well-mannered. No one would have suspected that he was one of the most merciless gangsters in the world. He made his two head men keep themselves under cover most of the time.

But now their whole world had exploded in their faces. The special prosecutor who had convicted them had not disappeared with the fall elections—instead, he had been elected district attorney. They had learned that the few murderous mobs who were still operating in New York were already breaking up and slipping out of the city.

"That's going to make it easier for us," Ugly said deep down in his throat. "Every copper in the country is going to be watching for 'em so they don't get their hooks into their city."

"Slip'll figure a way out for us," Lippy said, gulping the drink he held in his hand. "He'll have a racket up his sleeve. He's as bright as this new D. A. He

ain't never let us down yet."

"Once'll be enough," Ugly grunted. "He ain't never had the G-men after him before."

"They're a bunch of—" Lippy stopped as three sharp raps, followed by a pause, sounded on the door—then two more, then one.

"That'd be Slip," Lippy said and went toward the door. But before he opened it he slid his right hand down inside the front of his double-breasted jacket and wrapped his fingers around the butt of the automatic that nestled there.

Slip Ogden's eyes searched the faces of Ugly and Lippy briefly—but sharply—as he stepped into the room. His hard, blue eyes contracted for an instant, then expanded. They were set in a face that was hard, cunning and merciless. The waxed, black mustache he affected gave a flair to his well-formed, sleek head. He was groomed to an almost painful neatness, wearing his clothes draped over his lean, hard frame with perfect ease.

What his antecedents were no one knew, but he had the appearance of being born an aristocrat. He nodded to Lippy and Ugly as he might have acknowledged the presence of two menials in the room.

Lippy and Ugly were tough and hard and cruel—the worst products of the underworld. But they knew that Slip Ogden, in his own way, was tougher. They looked up to him as a small boy looks up to his hero. They



were afraid of him. They had seen the cold, ruthless efficiency with which he performed his tasks and they knew they had reason to be afraid.

They exchanged glances as Slip crossed the room and laid his light fedora and gloves on a desk. They waited for him to speak. They never committed themselves until they knew what kind of humor he was in.

Slip Ogden poured himself a drink with meticulous care, sipped it and put the glass down to light a cigarette. Then he sat down and took a black, gold-edged wallet from an inside pocket. He laid it on his knee.

"Boys," he said, "I came across a little item a few days ago that interested me. It interested me because it is a certainty that we must get out of the country. To do that we must have enough money to keep us going from now on. We've got to have a lot of money. I think I've found the way to get it."

He picked up the wallet, took a folded newspaper clipping from it and scanned it with his eyes.

"This clipping interested me," he went on, "and I made some inquiries. I think we're going to do some business. We'll have to take some other men in with us, but there will be enough for all of us. It will be dangerous."

"What is it, Slip?" Lippy asked. He couldn't keep still any longer.

"Wait a minute," Ogden snapped. He wanted to build up his story in his own way. "I don't think I ever told you boys that I once did quite a bit of flying."

They both looked at him with their piglike eyes open wide.

"What's that got to do with it?" Ugly asked.

"I had quite a record as a pursuit pilot during the War," Slip said.

Suddenly, some of the hardness and cruelty faded from his face. By studying him closely, one could see behind the mask he wore. One could see youth and courage and clean perfection. Then it vanished and one could see only the empty shell of what he once had been.

He became Slip Ogden, racketeer, again. He unfolded the newspaper clipping and handed it to Lippy.

"I assume you can read well enough to manage it," he said.

The faces of Lippy and Ugly were contorted into tortured frowns as they studied the clipping—both reading with their lips moving. The item was under a New York date line and read:

The Federal Reserve Bank of New York yesterday received word that a shipment of \$6,600,000 in gold was on the way here from Japan. This will be the fourth consignment of about this amount to be reported since last Saturday. It will bring the total of gold sent here by Japan since the middle of last March to \$197,400,000.

When the gold movement from Japan began last spring, it was customary for the Japanese authorities to announce engagements of the metal as soon as, or even before, shipment from Japan was made. In the most recent series of shipments, however, the practice has been followed of notifying the Reserve Bank here of the consignment of the metal only a few days before the ship carrying it was due to dock at San Francisco. This delay in reporting is due, it is thought in financial circles, to a desire to keep the shipments secret until vessels carrying them have left the zone of hostilities in the Far East.

The foreheads of the two gangsters were still wrinkled as they looked up from their laborious reading. Their eyes were frankly puzzled.

"One of those little shipments," Slip said, softly, "is earmarked for us."

"They're sendin' it to us?" Ugly asked, trying hard to get the thing through his dense head.

"If we go an' take it, eh, boss?" Lippy said.

Slip nodded.

"Piracy!" Ugly said and rubbed his throat. "They'll sun-cure us on the end of a rope."

"They didn't sun-cure Sir Henry Morgan," Ogden said.

"Is he a pirate?" Ugly asked.

"Not any more," Ogden said with that upward quirk of his mouth that was half a laugh and half a sneer. "He has been dead about two hundred and fifty years. He captured a number of Spanish cities and lots of Spanish gold along the Spanish Main in his day. They took him back to England for trial, but instead of sun-curing him—as you so quaintly put it—Charles II knighted him and made him lieutenant-governor of Jamaica."

"Ha, ha!" Lippy Freeman said.

Slip was looking at Ugly and Ugly, seeing the look in his eyes, began to tremble. He had seen Slip look at men like that before. He had never seen the men again—unless he had been the man Slip had designated to wipe them out.

## II—MISTAKEN IDENTITY

MR. I. KINTER HASSFURTHER, better known to the flying profession as "Shorty," threw the switch on his radio panel as a tiny light gleamed scarlet, and spoke into his microphone.

"Shorty acknowledging, Tony. Go ahead—go ahead," he said to Tony Lamport, superintendent of communications on Barnes Field, Long Island.

"Where are you, Shorty?" Tony asked. "Bill wants to know."

"Just at the moment," Shorty said, looking down under his wing tip, "I can see the cadet corps at West Point marching out on the field for their afternoon drill. I'm thinking about going down to join them. I always did want to be a soldier. You know—'There's something about a soldier, something about a soldier that is grand, grand, grand,'" he began to sing.

"Shut up!" Tony snapped at him. "Bill told me to tell you to whip up your horses. He's worried about Red."

"What's the matter with Red?" Shorty asked quickly. All the banter was gone from his voice.

"Bill will tell you when you get in," Tony said. "Hurry up!"

"I'm practically there," Shorty said and he pushed open the throttle of his supercharged, twin Diesels and laid the nose on Barnes Field.

A few minutes later he cut his gun, fishtailed down to reduce his speed and rolled his Snorter up on the apron.

Young "Sandy" Sanders, the kid ace of Bill Barnes' famous little squadron of fliers, was standing on the steps of the administration building, waving his arm at him as he climbed out of the cockpit of the big amphibian and started across the concrete.

"Hurry up, flatfoot!" Sandy shouted. "Bill wants to see you."

"All right, my diminutive little pal," Shorty said. The grin was gone from his lips and the twinkle from his blue eyes as he opened the door of Bill's office. He knew that Bill didn't cry "Wolf!" unless there was some reason.

Bill pushed a hand through his tousled, blond hair. His bronzed face took on an expression of relief as he



saw his right arm and chief of staff come through the doorway.

"Hello," he said. "Any luck in Toronto?" The words rushed out like the opening of a safety valve on a steam engine.

"I'll tell you about that later," Shorty said. "What's this about Red? Where is he?"

"I wish I knew!" Bill snapped. "The last we heard from him was three days ago from Nome."

"Nome!" Shorty said. "What's he doing in Alaska? The last——"

"I forgot," Bill said, "you left here before he did. The afternoon you hopped up to Toronto, fourteen thousand dollars' worth of automobile drove on the field. That's when the trouble started. I was thinking that you left here after he did."

"What about the fourteen thousand dollars' worth of automobile?" Shorty asked. "What was in it?"

"What is usually in an automobile that starts trouble?" Bill asked, bitterly. "A woman, of course."

"All right," Shorty said impatiently. "Let's have it." He and "Red" Gleason had started flying Spads and Nieuports and S. E. 5s over the French lines when they were kids and combat work was in its infancy. They were closer than brothers.

"You remember young Dick Reynolds, the electric washing machine heir?" Bill asked him.

"Pockets full of doubloons and head empty," Shorty said. "I remember him. The Douglas people built him

an air yacht and he started for Russia with some of his drunken pals to get some caviar. They disappeared over the Bering Sea last summer. Right?"

"Check," Bill said. "It was his sister who came around in the fourteen thousand dollars' worth of gilt and brocade. She wanted me to go find him."

"Just like that," Shorty said.

"Just like that," Bill repeated. "She wanted me to take the whole outfit and the BT-4, loaded with supplies, to look for him. She had a signed check in her hand and told me to fill it in for any amount I wanted to name."

"Yeah," Shorty said. "What happened after you refused?"

"How did you know that?" Bill snapped.

"I guessed," Shorty said dryly. "You never did like nugs who waved dough in your face. She put on the 'grand-dame' act and you said, 'phooey!'"

"Right again," Bill said. "But I told her one of my men would go up to investigate if one of them wanted to. I told her I would leave the decision with them."

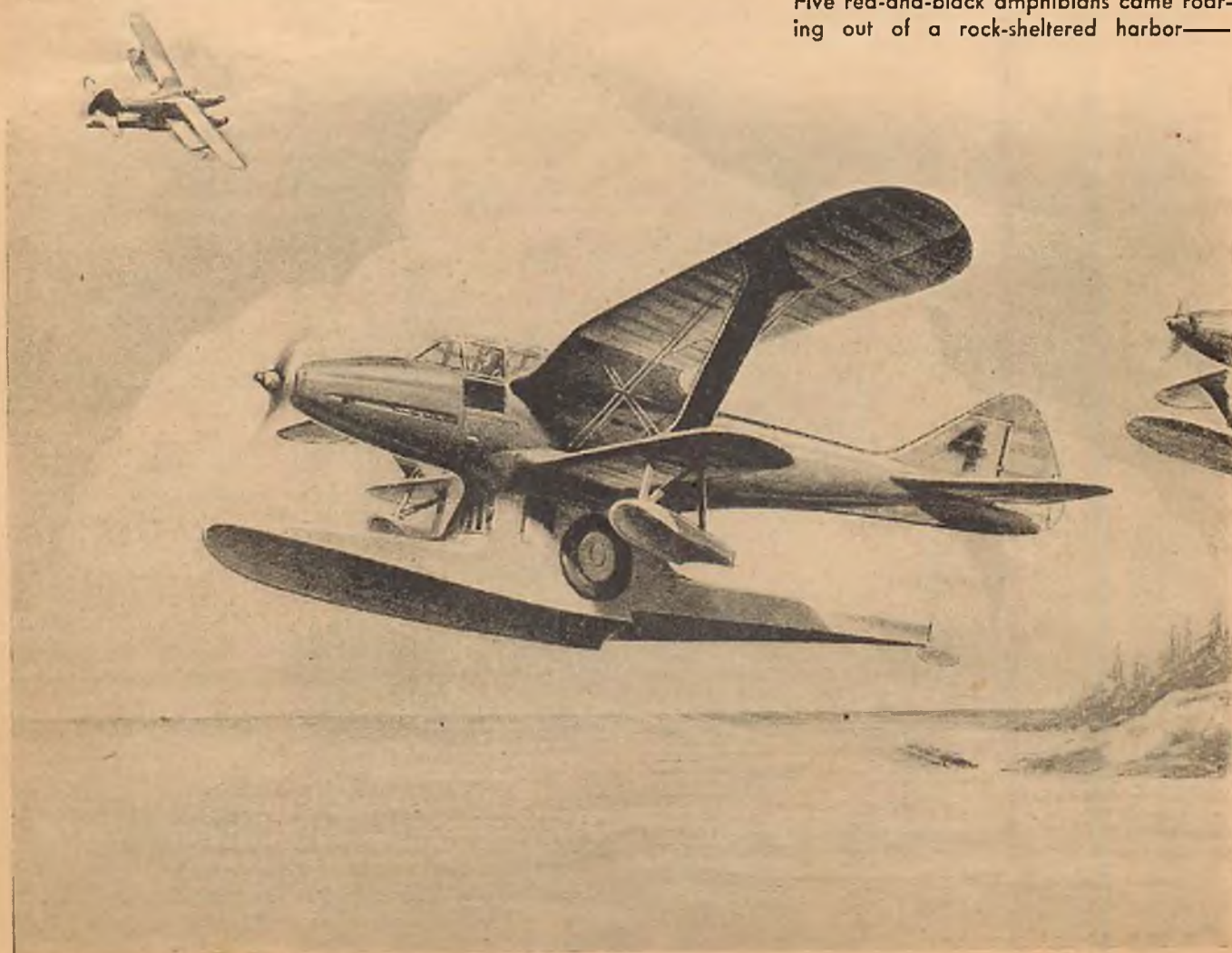
"And Red volunteered," Shorty said. "She must have had what it takes. Red likes the gals like he likes arsenic. She must have been a beauty!"

"She was," Bill said. "Tall and statuesque, I think you'd call her, with limpid brown eyes."

"Come on, Bill, what happened?"

"Red said he would go," Bill answered. "He hopped the next morning, following the regular air routes to Vancouver, Ketchikan, Skagway and Nome. We heard

Five red-and-black amphibians came roaring out of a rock-sheltered harbor——





from him last after he had left Nome. He was on his way down to Unalaska, a town on the island by the same name in the Aleutian Islands. The place is an outfitting station for ships passing from the Pacific to the Arctic."

"Then what?"

"He checked in with Tony when he was off the tip of the Alaska Peninsula. That was three days ago. Since then we've heard nothing. We sent out alarms to the fields at Nome and Flat, but we've had no word from him. He's disappeared completely."

"If he was forced down," Shorty said, slowly, "he could still have made contact by radio and given his position."

"But he hasn't," Bill said. He got up and paced the length of his office and back again. "I'm worried as hell, Shorty! Remember, we lost Mort Henderson and Cy Hawkins within the last year. I'm slowing up, I guess. I can't take these things any more. I—I feel that it's my fault. I shouldn't have let him go. It's too early in the year. Any one of a hundred things might have happened to his ship."

"He's way below the Arctic Circle. Have you been in touch with young Reynolds' sister since Red disappeared?"

"No. What could she do about it? If she couldn't keep her half-witted brother from trying to fly to Russia for caviar, what could she do about this?"

"I don't know," Shorty said. "Probably nothing. But

it's funny we had no radio message from Red. If he knew he was going to crack up, he would have made contact at the last moment to let us know. Did you check up on the Reynolds girl in any way?"

"No. I couldn't see any necessity for it. She left a signed, blank check here to be filled in when we decided what the fee would be. The check had her name and coat of arms embossed on it."

"Where did she get a coat of arms?" Shorty wanted to know. "Her grandmother got tired of taking in washings and her grandfather was an electrician. They got together through sheer fatigue and developed the Reynolds electric washing machine. I wonder——"

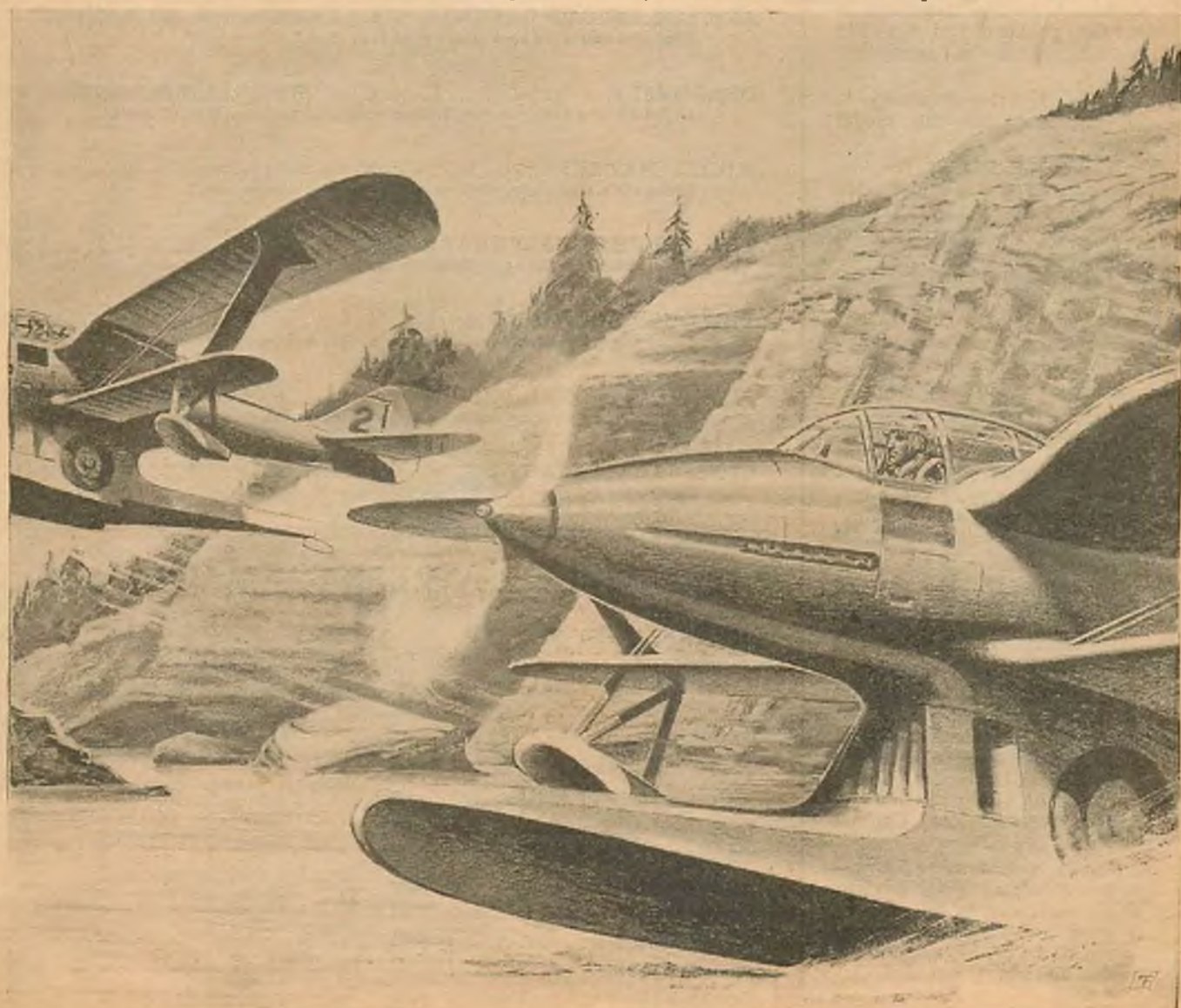
"You wonder what?" Bill snarled. "Do you think she was a phony? What are you getting at?"

"I don't know," Shorty said, "except that the whole thing sounds a little screwy to me. It's funny this Reynolds dame hasn't made any inquiries of you."

"About Red?" Bill asked. His teeth clamped down over his lower lip. "How did you know she hadn't?"

"I guessed again," Shorty drawled. "I don't like this thing, Bill. It isn't like you to stick your chin out this way."

"Like me!" Bill roared. "Listen. I'm slowly going nuts about this new light plane we're going to try to put on the market. Everything has gone wrong. I've been so busy I haven't had time to sleep or eat. (Turn to page 66)





# MODEL MAKING—

*Air Trails Department of Practical Construction*

## Guest Editorial

By Albert Lewis

*Albert Lewis—newly elected president of the Academy of Model Aeronautics. Well qualified to fill this position. Has long been active in New England modeling. Much of the success of the Junior Aviation League of Boston can be traced to his work on behalf of the model builders.*

Undoubtedly one of the most important advances for model aviation during 1937 was the establishment of the Academy of Model Aeronautics of the National Aeronautic Association.

Not only in the competitive field will the Academy spur on the sport of model building, but it was organized to foster scientific advancement in model aeronautics, to give recognition to model leadership and to provide guidance and direction in national model aeronautic affairs.

Definitely, the Academy is of, by, and for the model builder.

It was established for the scientific and administrative leaders of the hobby. In the A. M. A. first consideration will be given always to the seriously minded participant instead of the "joiner" or "I-don't-build-models-but-I-can-tell-you-how-you-should-fly-yours" type of hanger-on.

Among the outstanding projects of the Academy will be its sponsorship of the Annual National Model Aeronautics Conference, its quarterly publication, "Journal of the Academy of Model Aeronautics" and its bi-monthly, "Model Academy News."

The N. A. A. has charged the Academy with the drafting of all regulations governing model aircraft competitions and record trials; with the organization, supervision and conduct of the technical phases of the National Championship Model Meet, the Wakefield Contest or Wakefield Elimination trials; and with the administration and award of the National Contest trophies.

Briefly, you want to know—is the Academy goin' places? Well, we'll say it is! Watch it grow and remember its resolve—to be of, by, and for the model builder.

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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: Does the use of twin, vertical tails improve a model's performance from either the stability or the efficiency standpoint?

Next month's topic: Diamond fuse-lages.

For May—Is the one-bladed propeller likely to improve contest times to the extent that it should be incorporated in all contest designs? What do you consider to be the chief advantages and disadvantages of this newly developed device? Answers must reach us by February 15th.

For June—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? Answers must reach us by March 15th.

# The Discussion Corner

## PRO

**T**WIN rudders are aerodynamically sound and more effective than the single rudder. Here are the reasons: (1) Free of the slipstream and not bothered by fuselage eddies; (2) They raise the stalling angle of the elevator by reducing tip losses; (3) Lower center of lateral area for increased stability.—JOE WALSH, New Bedford, Massachusetts.

Twin vertical tails present less lateral area to side gusts that persist in changing the model's flight patch. Twin tails are outboard from the turbulent air over the fuselage and from the propeller. Consequently, they are more efficient and more stable. Since they are not in turbulent air, there is less induced drag—an especially important item for fast flying models.—EUGENE WENDT, Fargo, North Dakota.

By using twin rudders I have converted several otherwise poor fliers into consistent performers. The advantage of twin vertical surfaces is the ability to "mush out" of fatal stalls. This advantage alone makes twin tails well worthwhile.—ERNEST LLOYD MUNHOLLON, Cleveland, Ohio.

The use of twin vertical tails offers two advantages: It cuts down the structural weight, although not affecting the total fin area, thus adding to the efficiency of the model. The propeller torque is much more easily overcome because of the more evenly distributed fin area.—DANIEL KANEMITSU, Hilo, Hawaii.

Twin rudders are not affected by the wash of the propeller and the fuselage. Larger area can be used with less spiral instability. With twin rudders there is less tip loss of the elevator.—GLENN O'ROAK, Boston, Mass.

Twin vertical tails increase both stability and efficiency. They provide more effective directional control during the climb when a single rudder is blanked by the fuselage. The elevator can be made lighter and smaller since the twin rudders make it more effective by reducing tip losses. Torque trouble is reduced.—DOW SMITH, Toronto, Can.

## CON

The only use for twin tails is on bimotored airplanes where they are effective in the propeller slipstreams. Consequently, there is no reason why we should use twin tails on a single-motored model. Its disadvantages are: heavier elevator is necessary to support the twin rudders; more profile drag with two small rudders than one large one; difficulty in lining up twin rudders to prevent them from working against each other.—"THE BOILER MAKERS." RICHARD OBARSKI, JIM CAHILL, FRED MAYFIELD.

Twin rudders are not stable because of the difficulty in obtaining the correct amount of area. From the efficiency viewpoint they are definitely out because of: (1) added weight by mounting rudders at the elevator tips; (2) rudders being less effective since they are outside the slipstream. The fact that twin rudders have been successfully used on modern bimotored transports does not justify their use on single-motored models.—EDWARD LIDGARD, Chicago, Illinois.

Twin rudders require more area than the equivalent single rudder because of the blanketing effect of one on the other. It is difficult to adjust two rudders correctly to prevent their counteracting each other's effectiveness. Consequently, they would not be incorporated in a model intended for maximum flights.—CHARLES L. SCHIELE, Denver, Colorado.

Twin tails are not advantageous from either an efficiency or stability standpoint. Two rudders have more resistance; they cannot be mounted as solidly at the tips of the elevator as a single rudder can be attached to the center. If an increase in rudder area is necessary, it can be achieved by a larger single rudder firmly mounted in better fashion than by breaking up the area into twin rudders.—ROBERT PEEL, Mt. Pleasant, Utah.

Give me a single rudder! It provides ample stability with less weight. Twin rudders are heavier and tend to make the model fly in zigzag fashion unless carefully adjusted.—CHARLES BUNKER, Oshkosh, Wisconsin.

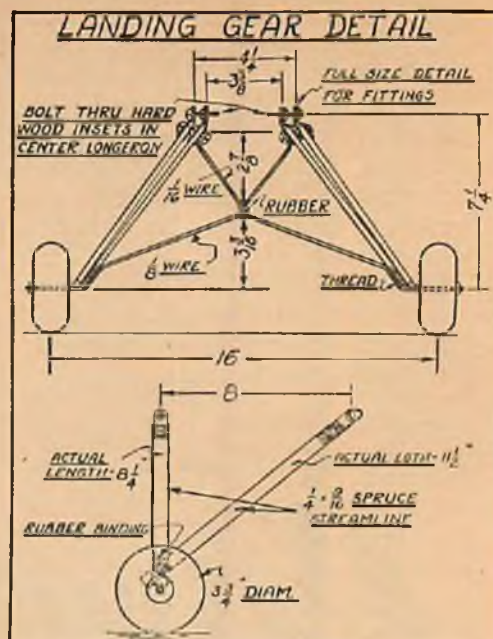


# MAXWELL BASSETT'S WORLD'S RECORD GAS MODEL

By Maxwell Bassett

*In collaboration with Gordon S. Light*

*19th Consecutive Air Trails Championship Model*



**K**EEP the model climbing steadily every second of the motor run" seems to be the keynote of Maxwell Bassett's contest success. His models are adjusted to make the most of the limited gas supply. Steep banks, stalls, and dives during the beginning of the flight merely waste fuel that should be used in gaining altitude. And regardless of how smooth the latter part of the flight may be, it can't equal that of Bassett's model which climbs steadily from the word "Go!" Of course, the soaring ability of his models converts the altitude into maximum duration.

Miss Philadelphia VI was built early in 1935 and has flown in several contests. Last summer, when Maxwell made a last-minute decision to enter the National meet in Detroit, the model required only a few minor adjustments

to put it in shape. The only real contest preparation he made was to build a spare wing. Despite being more than two years old, Miss Philadelphia VI took her place at the head of the gas model entry by turning in a record flight of 70:02 and winning the award for the most consistent flying.

The model has a slow flying speed—not much faster than a fast walk. This can be traced to ample wing area and low weight. The Cyclone motor provided ample reserve power for climbing, and the model got plenty of altitude before it started gliding. Bassett believes in ruggedness and simplicity of construction. Super-streamlining represents wasted energy and brings on complicated structures and gadgets that do not stand the wear and tear of consistent flying. Square-cornered fuselage,



Maxwell Bassett.

## ABOUT MAXWELL BASSETT

Gas models and Maxwell Bassett are usually sold in the same breath. The development of the gasoline model art can be traced directly to him. He and Bill Brown nursed this phase of the model hobby through its first perilous years. Maxwell turned in his first successful National contest performance in Atlantic City in 1932. This was after considerable experimenting before and during the contest. King Rubber ruled that contest, despite Maxwell's splendid showing. Nevertheless, at the next National meet he proved that rubber was no match for gas by winning the three National outdoor events.

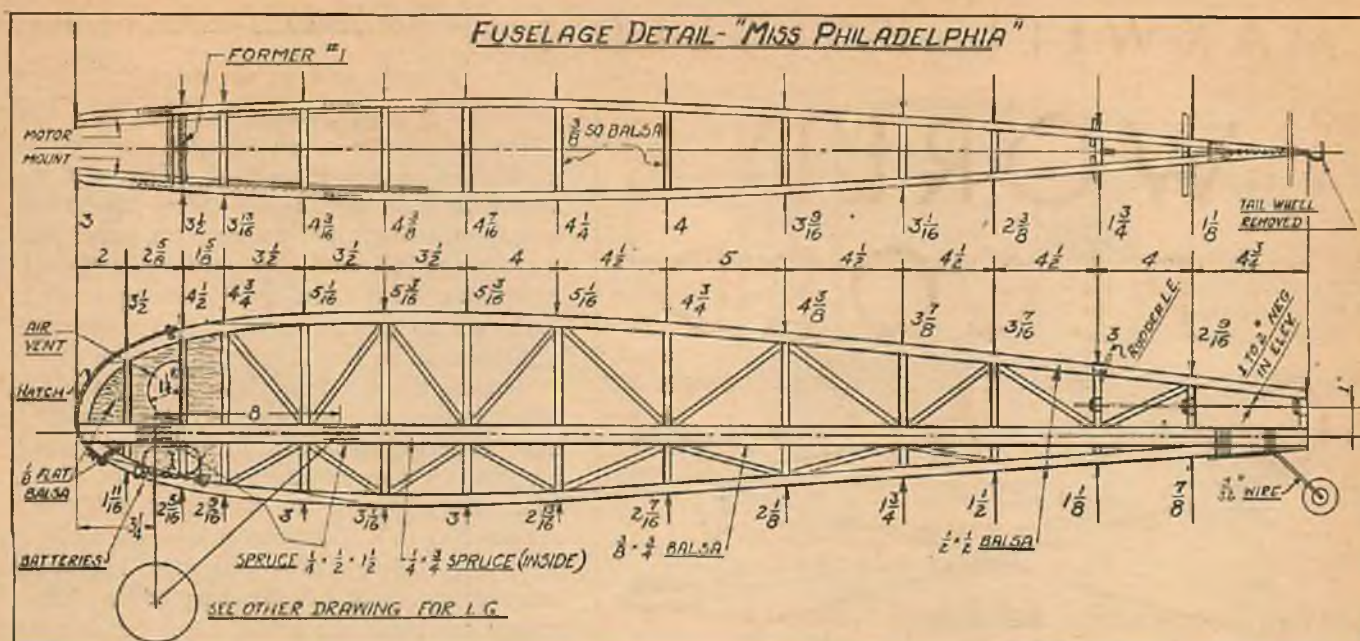
In the early days Maxwell was the only gas model entrant. But the popularity of gas models has supplied plenty of stiff competition in recent years. Last July at the National meet Bassett proved he still had the famous touch which makes his models such outstanding performers. He won the Open Class Gas Event with the longest flight of the contest. And to prove he was still the ace gas modeler, he took home the consistency trophy—given to the entrant having the highest total for the three official flights. His total was 164 minutes. Maxwell still holds the record for the longest flight with unlimited gas supply. Back in 1934 he flew a model for 2 hours and 35 minutes. It covered about 65 miles and was followed in an airplane.

Maxwell's opening wedge in the model hobby was made with outdoor and indoor rubber-powered models—back in 1928. It wasn't long before he sold out to the gas interests. Since then he's flown gas models in practically every meet of national or sectional importance. And he usually takes first prize—as his collection of thirty some trophies and an equal number of medals will bear out.

Bassett lives in Philadelphia. At present he's finishing his last year of engineering at the University of Pennsylvania. He's twenty-three years old. Aeronautics looks mighty attractive to him. Nevertheless, he's still undecided just what he'll do after graduation.

For the last several years he's been intending to retire from active gas model competition. Back in 1935 at St. Louis we heard him say that it was his last meet. But every year he returns to add a few more trophies to his collection, and every one hopes he'll continue to return. A gas meet without Bassett does not seem like the real thing.





straight wings, and exposed landing gear struts do not handicap a model which flies at low speeds. The performance of his model throws considerable weight behind this argument. Low wing loading, a dependable motor, a steady climb, and a flat glide are important factors in deciding the outcome of a gas model contest.

### CONSTRUCTION

Drawings used in this article have been scaled down from full-size plans. Because of space limitations, it is impossible to maintain any convenient scale. Therefore, each part has been dimensioned.

The list of materials and the drawings call for spruce. However, any other available hardwood can be substituted.

### FUSELAGE CONSTRUCTION

First make a full-size sketch of the side panel. Bend the longerons to the outline of the drawing by using  $\frac{3}{4}$ " brads, nailed along the edges at 2 or 3" intervals. Cut the fuselage upright-braces and insert them between the center and the two outside longerons. Cement the rear braces first, and then progress toward the nose. Be sure that all joints are tight and provide a good cementing surface.

Lift the two side panels off the drawing and join them together. No full-size top view of the fuselage is necessary. The widths at the various stations are available from the included drawing.

After all cement joints are firm, round off the edges of the fuselage with a small plane and sand them smooth. Remove all rough spots that will mar the covering.

### MOTOR MOUNT

Practically any of the popular make of motors can be installed with little trouble. The fuselage nose was originally designed to accommodate a Brown Jr., and the hardwood motor mounts have been spaced accordingly. However, the included sketch of the Cyclone Motor installation will clearly indicate the procedure to follow where the holes in the mounting flanges are spaced differently. Sheet-metal extensions are securely bolted to the crankcase shoulders and extend over to the motor mount where they are securely fastened, as shown in the sketch.

Brass clips are used to help hold the batteries in position and to provide electrical contact.

These clips are attached to the fuselage cross-braces with small wood screws. They should contact the battery firmly. Two  $\frac{1}{4}$ " wide aluminum straps run over the tops of the batteries and fasten to the cross-braces. Rubber is bound across the bottom.

All wires in the ignition system should be soldered. Make sure the joint to be soldered is thoroughly cleaned by sanding or scraping and the soldering iron is well tinned.



Nose details and motor mount arrangement.

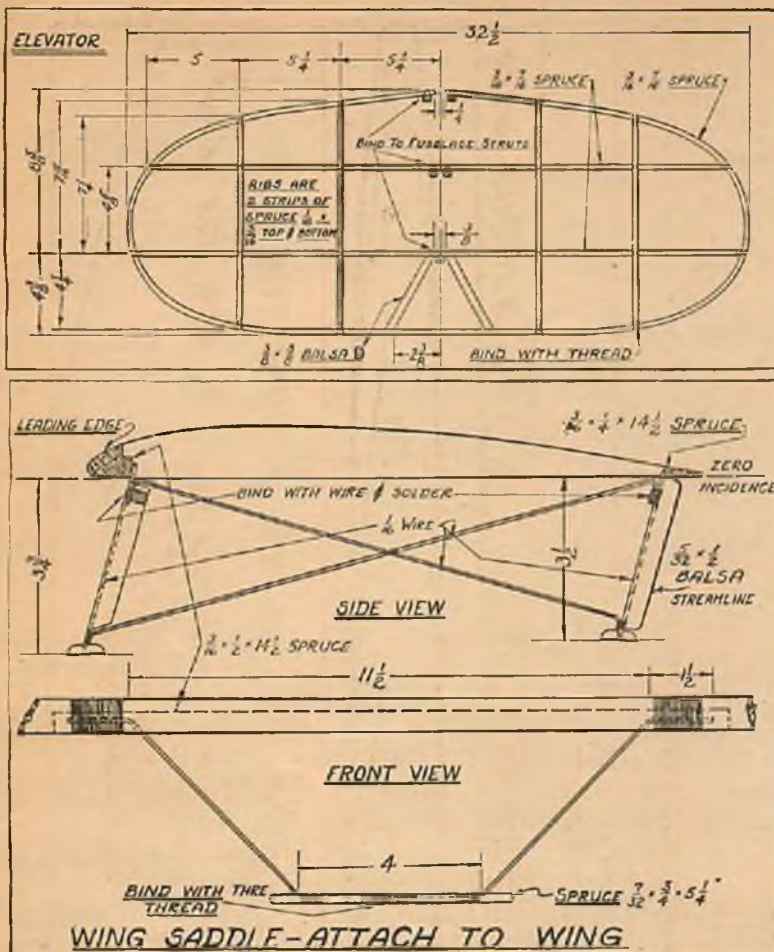


America's most famous gas model in flight.

### LANDING GEAR

Bassett has found this type of landing gear to be particularly rugged and serviceable. First streamline the spruce struts (lengths given in landing gear drawing). Be careful not to take too much wood off, thus weakening the struts. The rear struts can be tapered down to  $\frac{3}{8} \times \frac{1}{4}$ " at the end which joins the axle. The attachment fittings for the landing gear struts are made from





strands of  $\frac{3}{16}$ " rubber to join the struts and about five or six to connect the "V" struts.

### TAIL ASSEMBLY

The tail group is an integral part of the model and is not removable. First cut the spruce elevator spars to the correct shape and length—tapering slightly toward the ends. The spars are then bound and cemented to the upright braces of the fuselage. At this point it is important to check the angle of the elevator, which should be 1 or 2 degrees negative.

Bending the wood for the outline of the stabilizer is the most difficult step in its construction. A suggested method is to steam the wood for about an hour and then spring it into shape. Place brads around the outline of a full-size tail drawing to hold the wood in shape while it is drying. Successive steamings might be necessary to accomplish the sharp bends. Allow at least five hours for drying before the wood is attached to the spars.

When joining the outline to the spars, make sure that the elevator is perfectly true. Bind each spar-outline joint with thread passed through a small  $\frac{1}{10}$ " hole in the spar. Check the alignment again before adding the ribs, since it is practically impossible to warp the elevator after they are in place.

Flat strips of hardwood (spruce) are used as ribs. These strips pass over the top and bottom of the spars and are bound to the outline. When drilling  $\frac{1}{16}$ " holes in the ends of the ribs, clamp the end in a vise. This precaution prevents splitting the ends.

Rudder construction differs from the elevator in that the ribs are flat balsa and it is made in two pieces. The forward portion (fin) is rigidly attached to the fuselage, while the movable portion is hinged by soft, copper wire hinges. An aluminum rudder adjustment is attached to the rear, lower edge of the rudder. Its shape is shown, full size, in the drawing. It clamps onto the rear edge of the elevator and is used for holding any desired rudder adjustment.

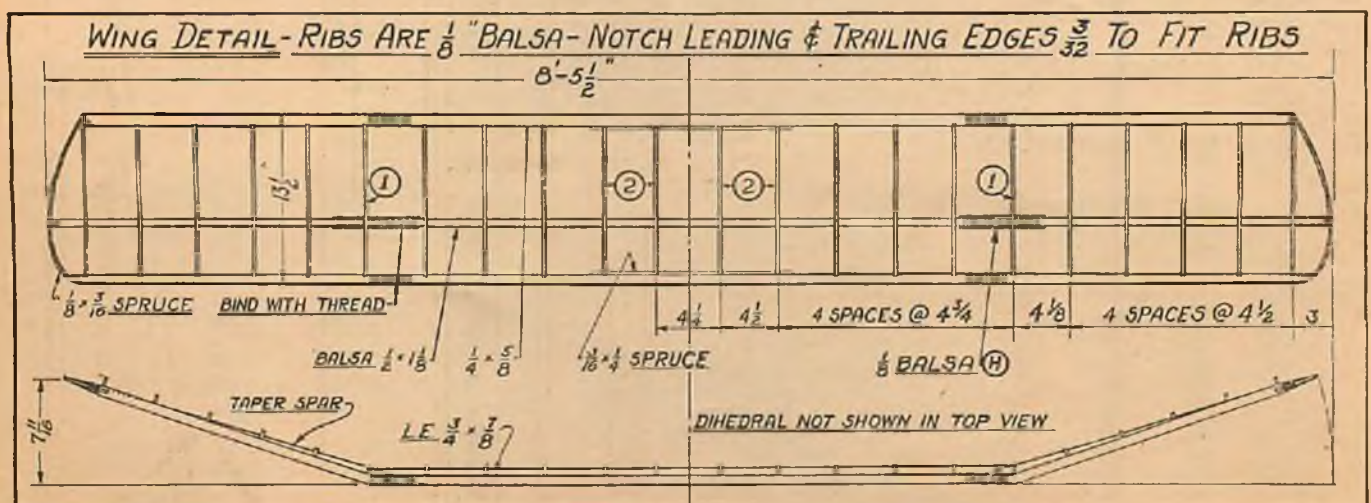
### WING

Ribs are all practically the same except for slight differences in the notches for the spars, as (Turn to page 89)

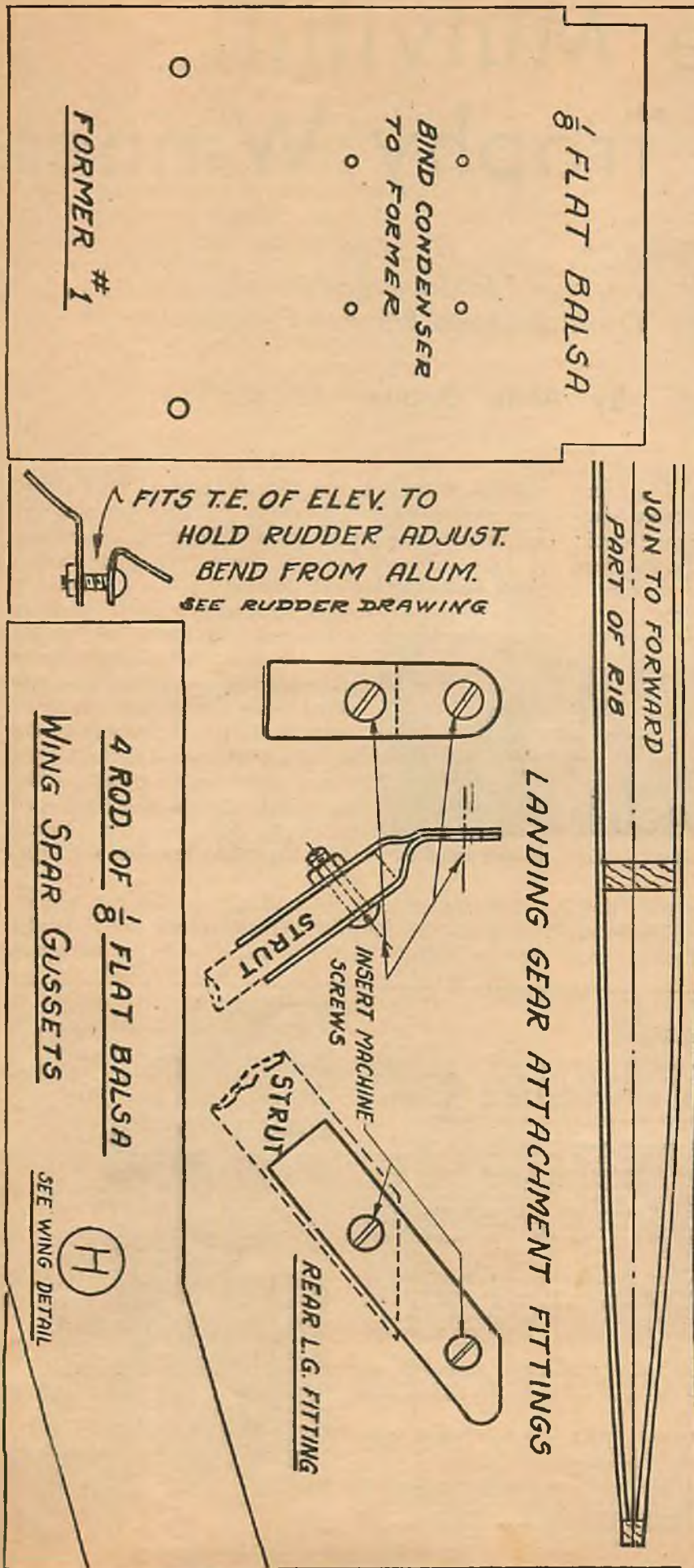
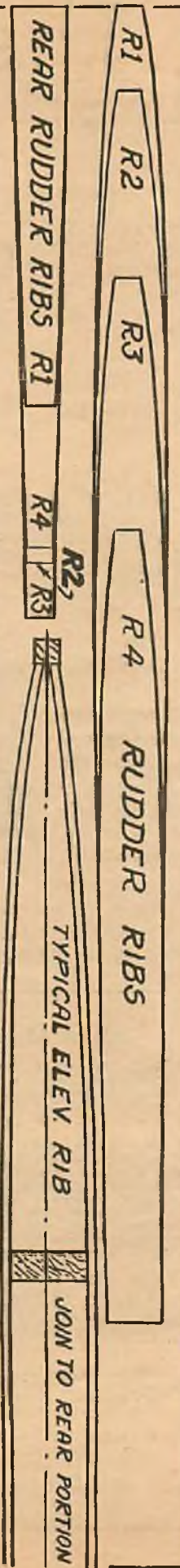
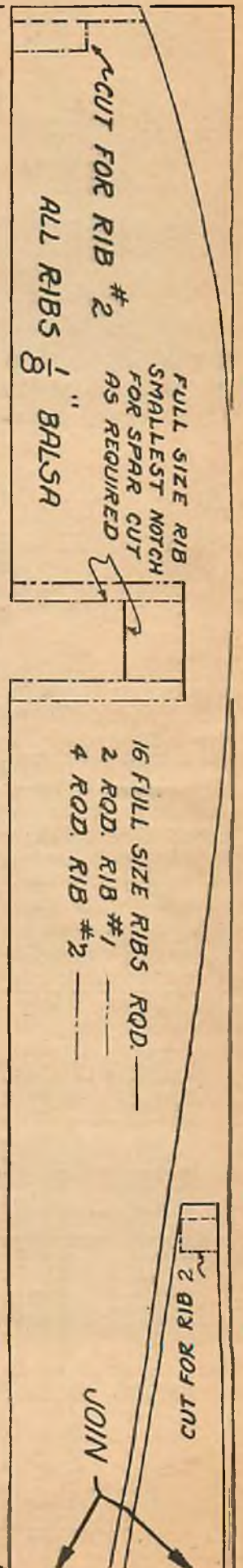
#28 gage galvanized iron or steel. Brass of slightly thicker gage can be readily substituted.

In attaching the fittings to the ends of the struts, first cement and bind them in place. After drying, drill the holes through the metal and the struts in a single operation. Insert a machine screw and nut as an additional guard against the fittings slipping off.

The "V" strut and axles are made in one piece from  $\frac{1}{8}$ " diameter piano wire. Another "V" strut is bent from  $\frac{1}{16}$ " wire which extends down from the fuselage. The shock-absorbing effect is obtained by using rubber bands to bind the rear struts to the front struts and by using rubber to connect the two wire "V" struts. Use about fifteen











Alvie Dague launching his Mulvihill winning model.

# The Mulvihill Trophy Winner

*Complete plans for duplicating another N. A. A. record holder—the 20th consecutive Air Trails championship model presentation*

By Alvie Dague *In collaboration with Gordon S. Light*

ABOUT 2:30 in the afternoon of July 8th, Bruce Luckett and Alvie Dague, Jr., went "thermal hunting" on the Wayne County Airport near Detroit. It was the day of the Mulvihill Trophy contest and these two modelers from Tulsa, Oklahoma, were determined to keep the Mulvihill Trophy in their city—where it had spent the past year by virtue of Luckett's Mulvihill victory the year before.

Their search finally narrowed down to a point near one of the diagonal concrete runways. They decided the models would drift over a large portion of the hot runway during their flights. Dague was the first to fly. It took considerable courage on his part to pack 560 turns into the rubber motor, since he had already ruined one stick model earlier in the day when the rubber broke. The model went into a fast right-spiral climb and had gained con-

siderable altitude by the time it began to hit "bumps" over the runway. The model drifted across the road and over a wheat field before it began to hit any real risers. And then a few minutes later it was a tiny speck under the big cumulus clouds.



Dague's National contest trophies.

The red covering of the wing and tail helped keep the model in sight. Sun flashes on the polished propeller and motor tube prevented losing the model before it had made good time. Another Tulsan, Dewitt Ross, followed the model in his car. There were five persons in the car watching the model. Nevertheless, the chase ended after 33 minutes and 2 seconds when the model flew into a cumulus cloud.

Dague's time was about 10 minutes ahead of his nearest rival—the Mulvihill Trophy would spend another year in Tulsa! Luckett didn't mind losing the trophy

## About Alvie Dague

Alvie Dague, Jr., of Tulsa, Oklahoma, is the most outstanding modeler in the country. A review of his victories at the last National meet in Detroit proves why. He won the Mulvihill Trophy, the Bloomingdale Trophy for the second consecutive year, placed 2nd in the Wakefield elimination contest, and 3rd in the Moffett Trophy contest. Dague is a serious threat in any type of model contest—indoors or out, gas or rubber-powered.

Dague started modeling in 1932 as a flying-scale enthusiast. But he soon turned to endurance models and in recent years they have claimed most of his attention. During the early years of his modeling career he profited by the instructions given by two fellow club members. Franklin Williams taught him the fundamentals of construction, while Charles Stewart initiated him in the art of adjusting a model. The combination of these two able instructors and an especially bright student was certain to bring results. When Dague made his National contest debut at St. Louis in 1935, he returned with 5th in the Mulvihill and 17th in the indoor stick event. In 1936 he took 2nd in the Mulvihill and 1st in the Bloomingdale indoor cabin model contest.

Alvie has been active in the Model Aeronautical Engineers club—the focal point of Tulsa modeling interests. He's done much to make Tulsa the outstanding modeling city. Throughout the year MAE members carry on their model feuds in a series of local contests. This active program keeps them in fighting trim. And they are set to go into action when the summer contests are announced. Then they join forces and "gang up" on the trophies in a manner most discouraging to modelers from other cities.

At present, Dague's ambition is twofold: to become a full-fledged aeronautical engineer and to win the Bloomingdale Trophy again in 1938. He's already taken definite steps toward these goals. He's finishing his first year of college engineering training with all his spare time given to model experimenting.

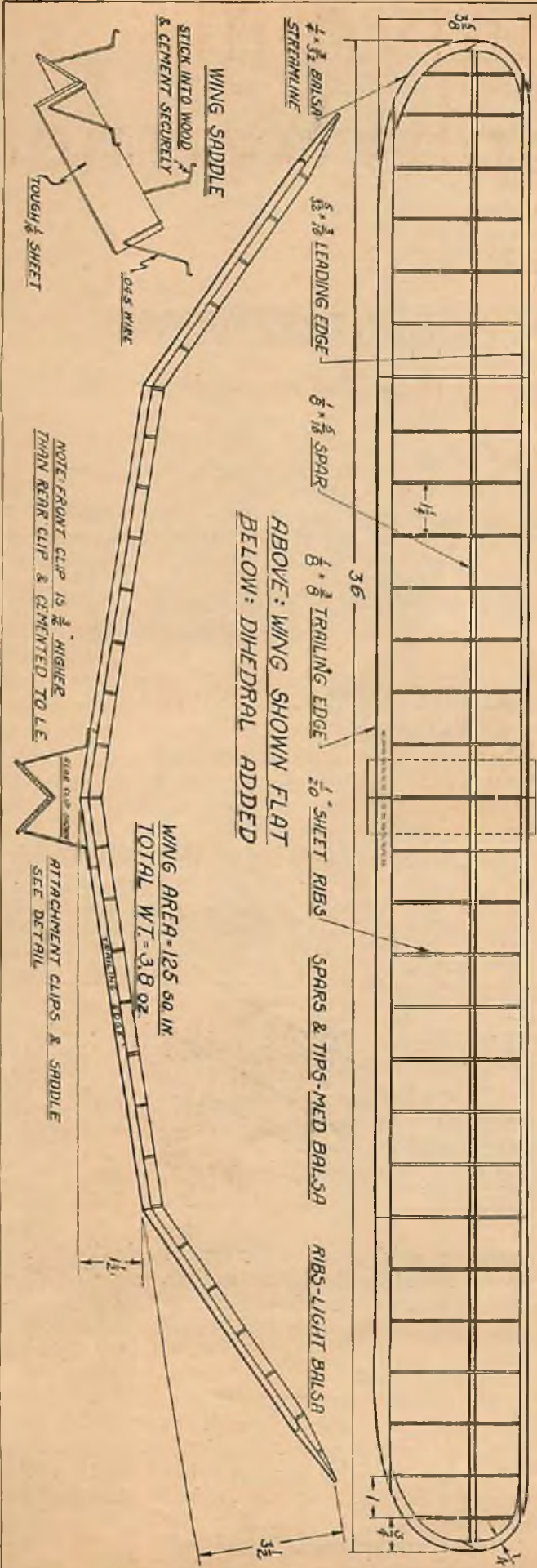
It was with considerable relief that we learned Alvie intends to remain a model enthusiast in the years to come. Despite all his achievements, he thinks there is still a great amount of work to be done in model airplane development.

Tulsa citizens appreciate the model celebrity who lives in their city. This summer, model-minded citizens joined forces to sponsor his trip to England for the Wakefield finals. Unfortunately, he wasn't successful in bringing the trophy back to the United States. He hasn't abandoned the Wakefield quest. And we believe he'll be present in the American line-up when we go to bat for the trophy next year in France.

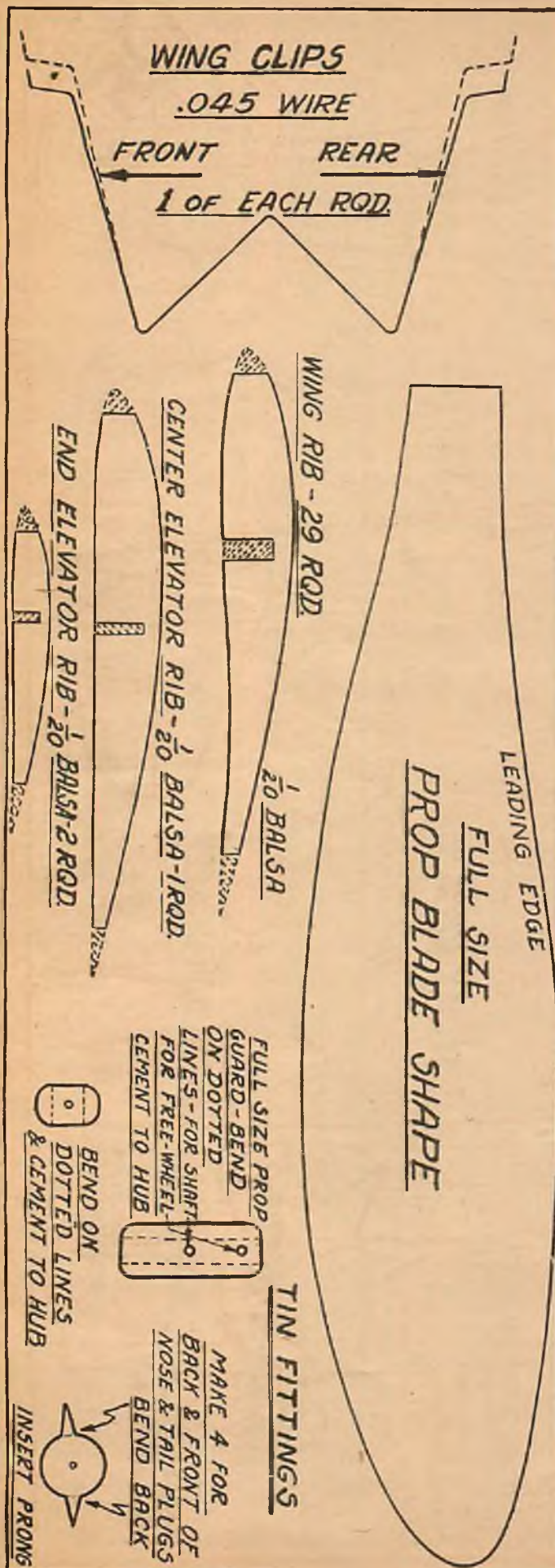


Alvie Dague and his 33-minute Mulvihill job.







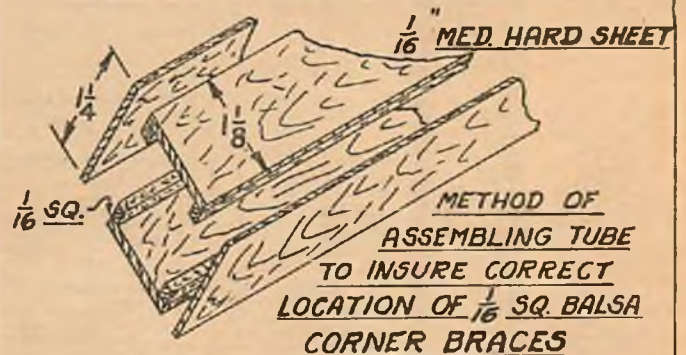


to his fellow club member. The best he was able to do was to take-5th.

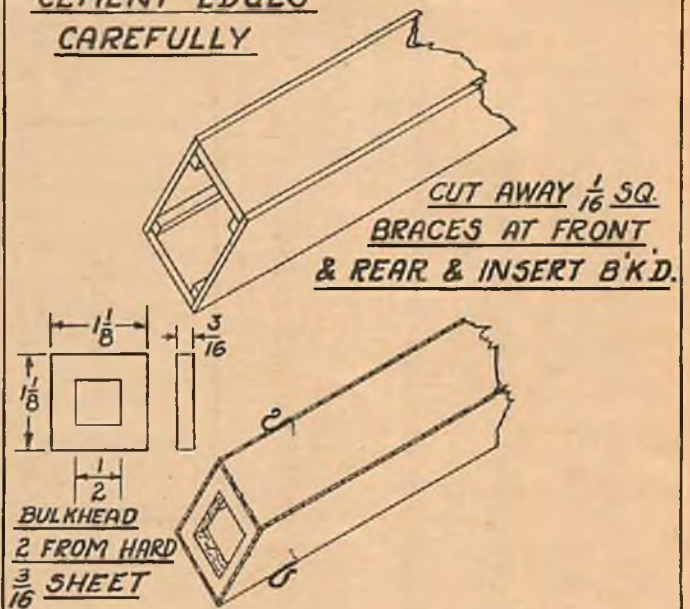
Alvie credits this model as being the best outdoor flying model he ever built. This fact is especially impressive in view of Dague's long list of contest-winning models. This model was built in November, 1936 and turned in a few flights under the old weight rule. When the new weight rule of 3 ounces per 100 square inches went into effect, the only change necessary was the addition of extra strands of rubber to bring the model up to weight.

The flight of the model was not handicapped by the

### MOTOR-TUBE DETAIL



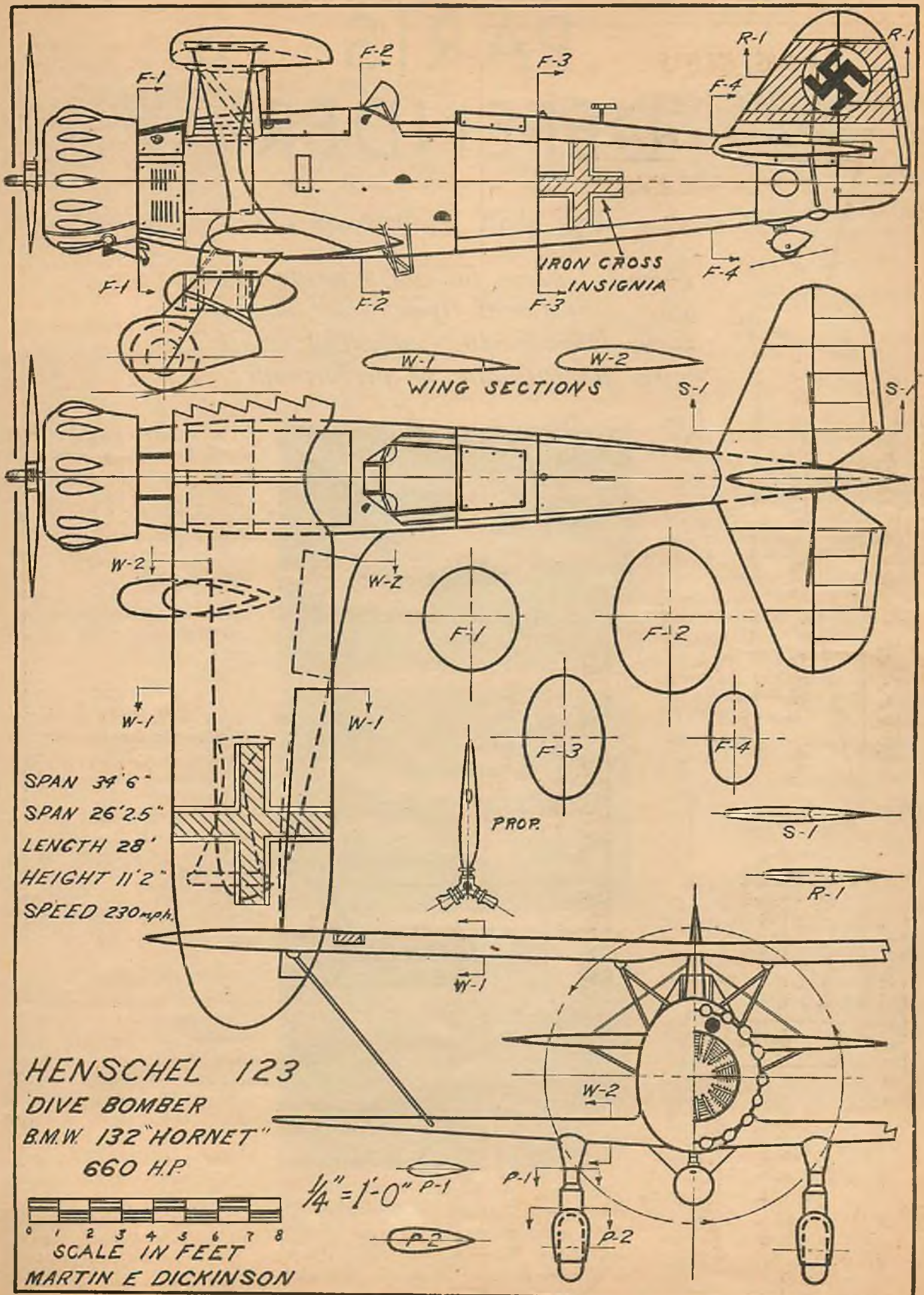
### CEMENT EDGES CAREFULLY



increased weight. At a local contest in Tulsa, the model turned in the fastest and steepest climb. Its performance was more impressive than the old weight-rule models. The glide was not quite satisfactory—requiring further adjustment. Otherwise the flight was practically perfect.

The improved performance of the model was the result of decrease in drag through cleaner design, combined with greater power. The inclosed motor and the elimination of the landing gear reduced the drag. The propeller had a 22½-inch pitch, 15 inches diameter, and a small amount of blade area. Driven by 24 strands of rubber, the propeller would give the model a startling burst of speed at the beginning of the flight. (Turn to page 88)









# PARIS DEFENDER



By Alan D. Booton

*Detailed plans for constructing another sensational flying scale model—the Bleriot 510, combining detail with the ultimate in performance.*

**T**HOUGH the name Bleriot recalls daring flights made in flimsy planes at the beginning of the present century, the Bleriot 510 is one of the latest French single-seater fighters, nine times faster than the first Bleriot. The top speed of the 510 is 231 m.p.h. It is powered with a liquid-cooled Hispano-Suiza engine of 500 h.p.

The model has the same snappy appearance and zest for flying. The construction is simpler than the usual flying-scale model. Being much lighter, it will turn in longer, more graceful flights without fear of damage. The shockproof landing gear is a great help.

## FUSELAGE

Prepare a 4x6" sheet of  $\frac{1}{16}$ " thick plywood and cut out the formers. Assemble one half of the fuselage frame composed of half formers from A to H, top and bottom longerons and the two stringers right on the drawing. When fully set, remove the half frame from the drawing and add like parts right on the first half. Now cement the formers B2 and C2 in place, then the  $\frac{1}{8}$ " sq. landing gear and cabane struts support strips in the slots cut for them. Install the rear hook. Cement plain first bottom ribs to the ends of the fillet formers in the position shown and then cover the designated portion of the fuselage with  $\frac{1}{32}$ " or thinner sheet balsa.



Three views of the miniature Bleriot 510. The construction is light and the inherent stability of the model guarantees a reward of many good flights. Top—Two flight shots. The one at left taken at instant of take-off; right, climbing past the camera.

(The fuselage may be completely covered with sheet if desired.)

To shape a neat set of vents between formers A and B, slice through the sheet on the front lines and cement pieces in to flare the cover.

Dope and polish the sheet cover with fine sandpaper, then carefully cement the bamboo fairing strips on.

## WINGS

Assemble the wing frames right on the drawing, omitting the ailerons. Before removing the frames from the drawing, sever the ribs and insert the aileron parts. Crack the top wing members at the two second ribs and block the tips up  $\frac{1}{4}$  or  $\frac{3}{8}$ ". Then cement the cracked places and leave until dry, in order to maintain the proper dihedral angle.

## TAIL SURFACES

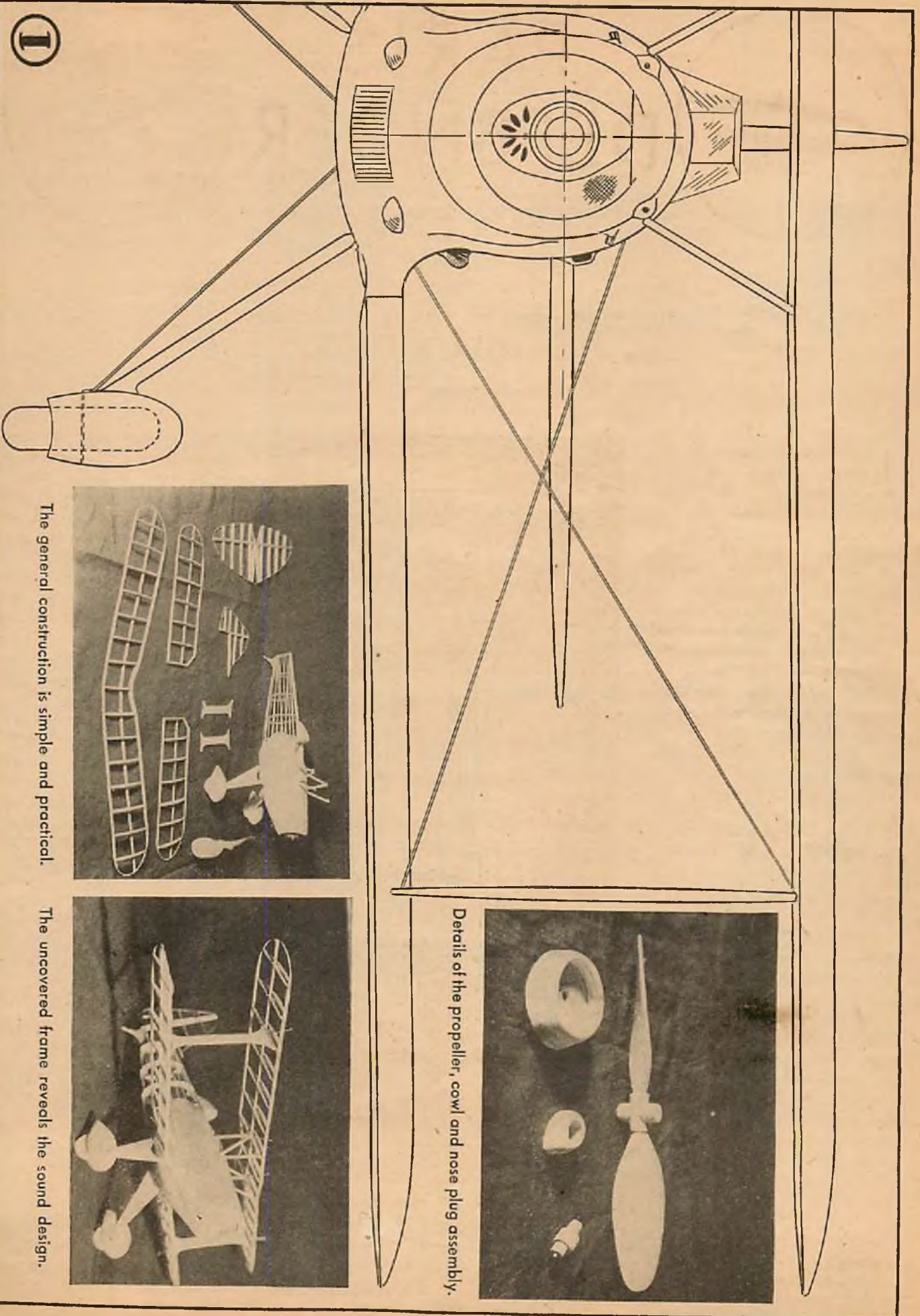
Assemble the vertical and horizontal tail surfaces without shaping the ribs and spars. When the parts are dry, remove the frames from the drawing, trim and sand the ribs to the desired shapes.

## LANDING GEAR

The landing gear is one of the simplest shockproof types. In preference to mounting the landing gear rigidly to shear off easily, a music-wire arrangement is used instead—as shown by the detail on (Turn to page 79)



1

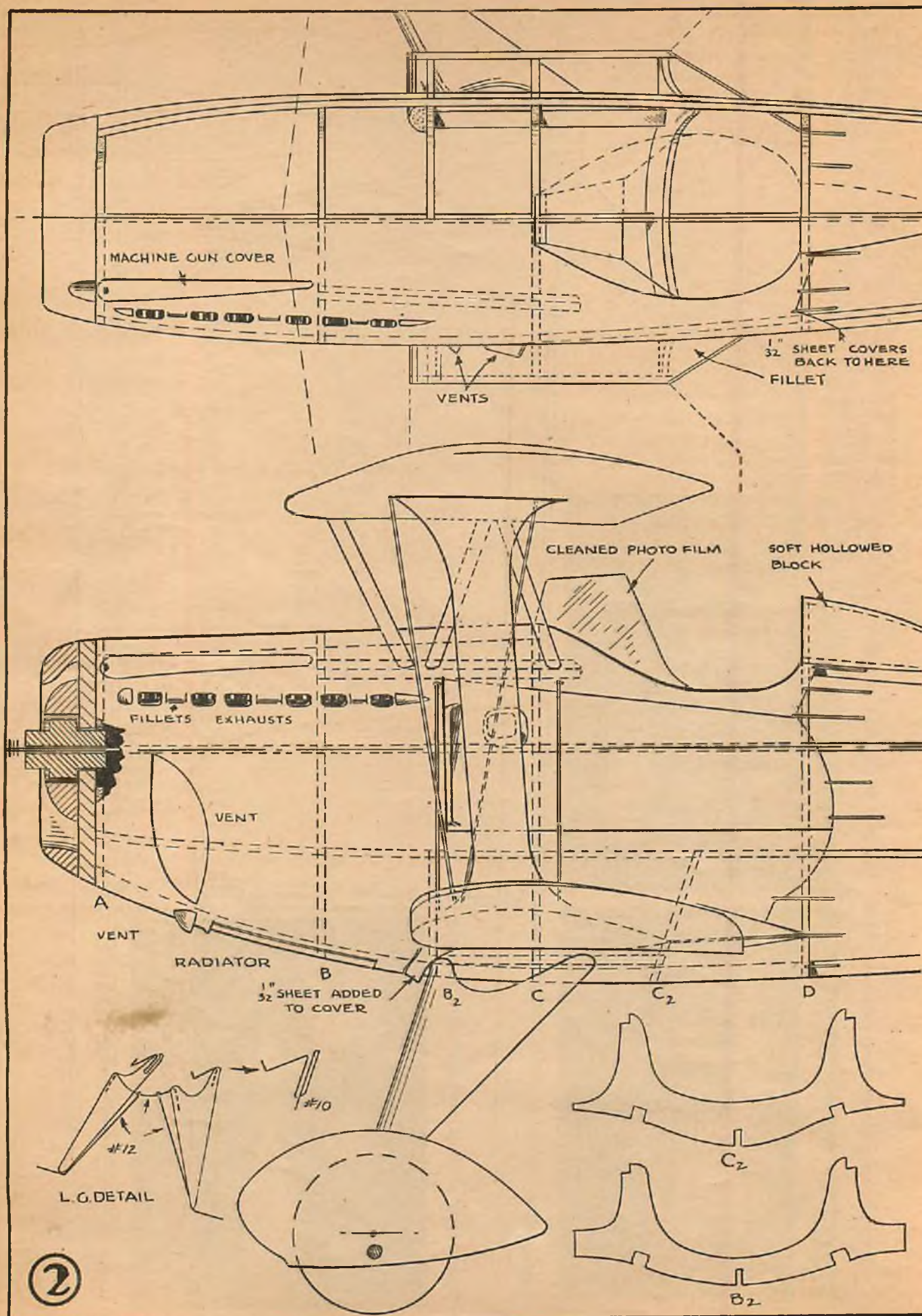


The general construction is simple and practical.

The uncovered frame reveals the sound design.

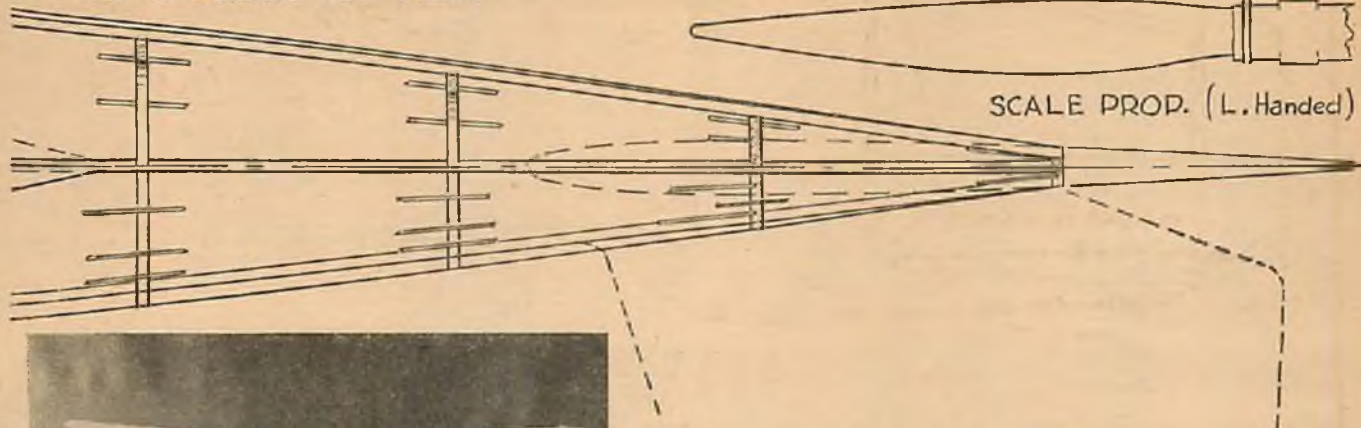
Details of the propeller, cowl and nose plug assembly.



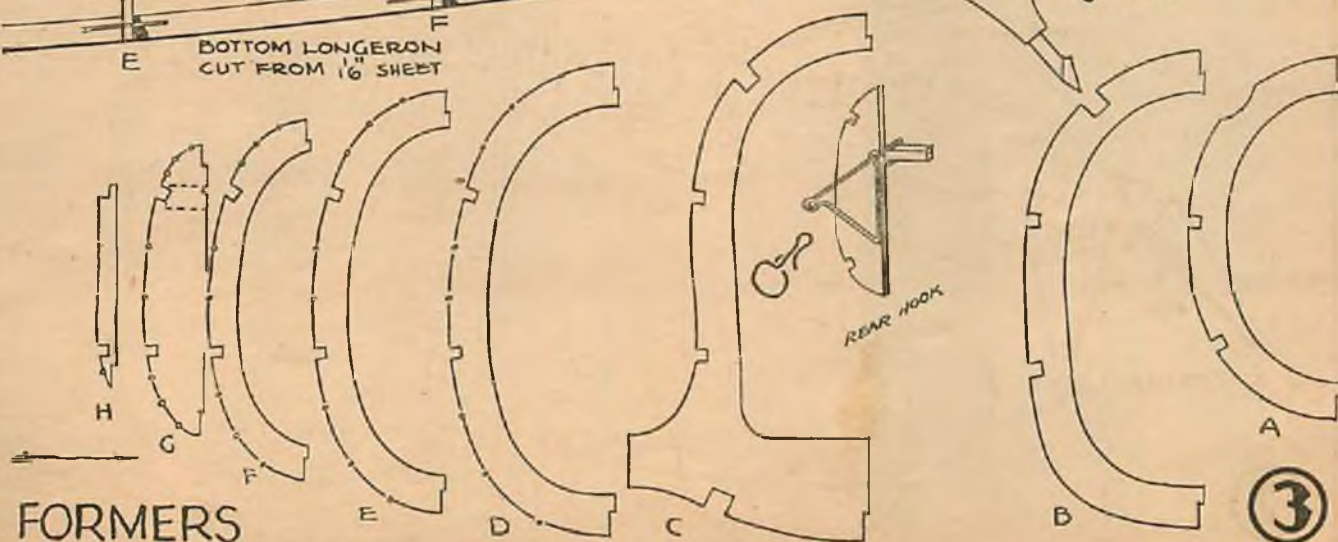
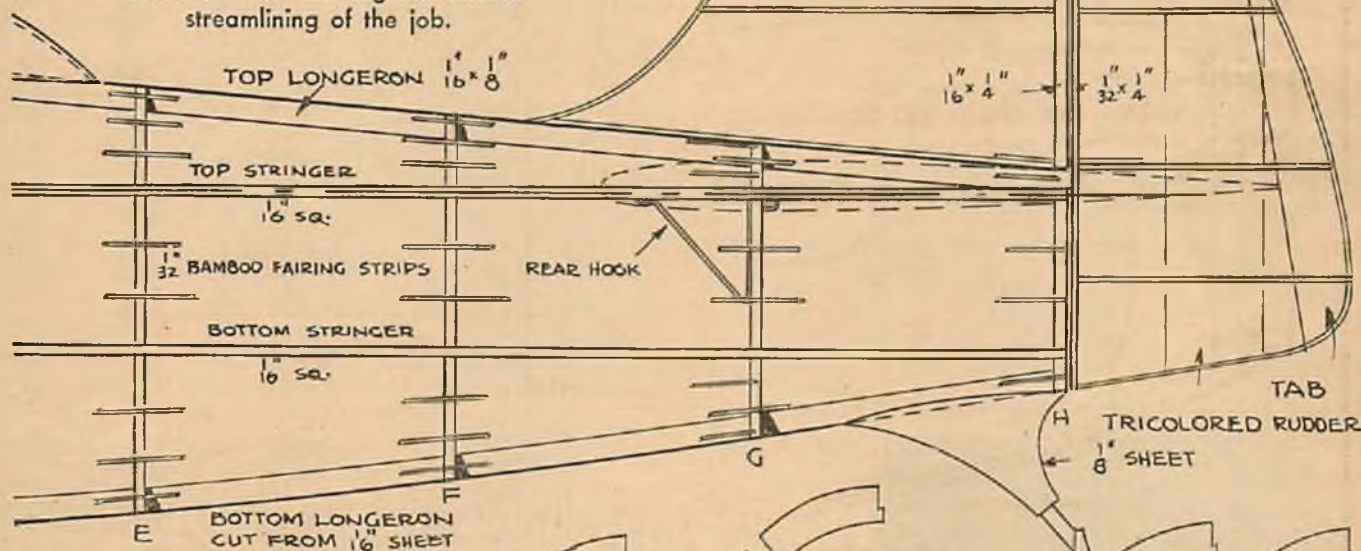




SPECIAL NOTE. RIGHT HALF OF TOP VIEW DRAWING SHOWS STRUCTURE BELOW BOTTOM STRINGER. LEFT HALF IS NORMAL TOP VIEW.



Head-on view showing the smooth streamlining of the job.









# Are You Indoor Green?

*What it's all about—a graphic description of benefit to those who have not had the opportunity of witnessing an indoor contest. Unusual kinks, methods and designs.*

By

Lawrence N. Smithline



Launching an indoor model. Indoor models are never pushed when launching.

TO the "indoor stranger," indoor fliers seem to be fit inmates for the best asylums. A person going to an armory for the first time would see fellows running around in circles with their hands above their heads, others walking very gingerly, and still others twisting eggbeaters on the middle of the floor—apparently for no good reason at all. However, these people are not really crazy. They are merely tending to the business of indoor flying.

Here we are, strangers to the indoor doings. But this is our chance to find out some of the things indoor modelists do and why they do them.

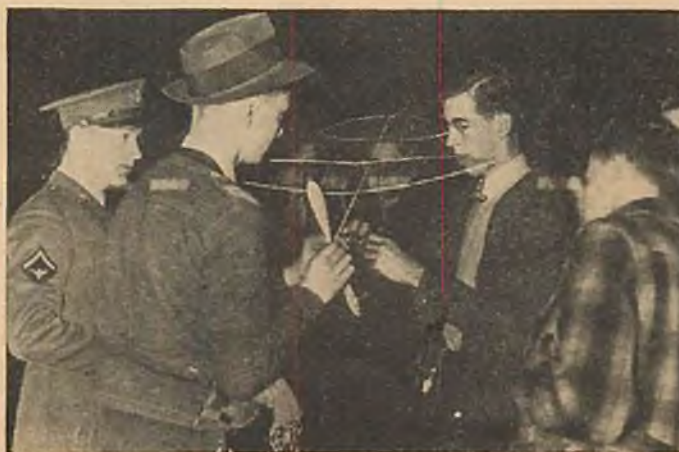
Because of the nature of the construction of indoor models, the method of launching them is different from the launching of other models. The most outstanding point in launching an indoor model is that the model is never pushed. It is gently thrust forward at about the flying speed of the ship. If you are observant you may notice two things which the modelist does just before the actual release of his model. First you will notice that he holds the torque wing low, and second, immediately after releasing the propeller, he will twist the wing on the right side to a greater incidence. Both of these tricks are used to prevent the model from washing out after the first burst of power. Sometimes, about two seconds after the release of his model, you may see the modelist do either one or both of these peculiar things. He may dash after the model, his hand either pushing down or up on the stabilizer, or he may run underneath the model, waving at one of

the wings. You may guess the reason for pushing the stabilizer. The model looks as if it is going to stall or dive, and to prevent this he pushes the tail up or down. He waves at the plane in order to create an up-current to raise a wing that appears inclined to washout. Of course, in a properly set model, it is unnecessary to do any of these things.

Most beginners have "washout trouble" with their first really light indoor plane. Usually the cause for this is the fact that the clips slide around the motorstick, changing the washin and washout of the wing. This annoyance is easily remedied by binding the wire clips together at the motorstick with thread (so that they cannot slip). Another cause may be that the balsa stilts are too flexible. This, of course, is remedied by beefing up the stilt. But usually the model builder finds this out very soon, as balsa cannot take much flexing and soon breaks. In the case in which the wings are actually weak, two "outs" present themselves. First, the wings may be braced with tungsten wire; second, "stabs" may be attached to the wings. A stab is merely a bit of area (about two or three

square inches) stuck out about three inches behind the wing on a boom attached to the front and rear spars and about the second or third rib from each tip. The stab system is praised to the rafters by some builders who even purposely make weak wings to use them.

After you're in the armory for a little while, you may hear something like this, "Hey, Bill, mine's doing 55." To which Bill answers, "Yeh, that's not so hot. (Turn to page 83)



A contestant transferring rubber from winder to hook.



# DRAGONFLY

By  
William Winter

THE name DeHavilland is a synonym for efficiency and beauty in aircraft. Distinguished for their symmetry of line, DeHavilland products also display a performance not at all in keeping with their low horsepower engines.

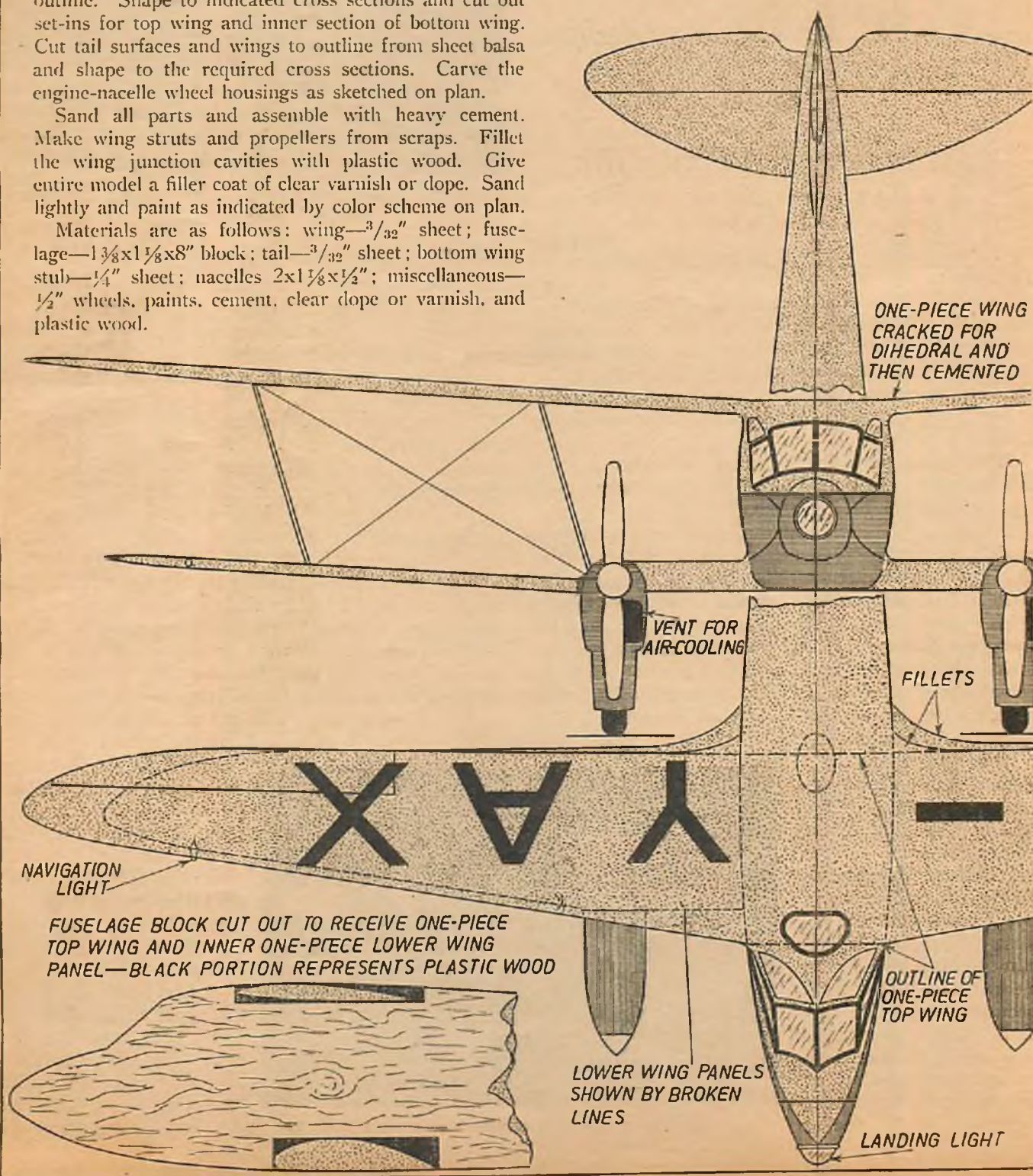
The Dragonfly is a baby bimotor, spanning but 43 feet. Its two 130 h.p. Gypsy-Major engines can propel the Dragonfly at 144-147 m.p.h. Seating is for three.

Cut the fuselage block first to profile, then to top-view outline. Shape to indicated cross sections and cut out set-ins for top wing and inner section of bottom wing. Cut tail surfaces and wings to outline from sheet balsa and shape to the required cross sections. Carve the engine-nacelle wheel housings as sketched on plan.

Sand all parts and assemble with heavy cement. Make wing struts and propellers from scraps. Fillet the wing junction cavities with plastic wood. Give entire model a filler coat of clear varnish or dope. Sand lightly and paint as indicated by color scheme on plan.

Materials are as follows: wing— $\frac{3}{32}$ " sheet; fuselage— $1\frac{3}{8} \times 1\frac{1}{8} \times 8$ " block; tail— $\frac{3}{32}$ " sheet; bottom wing stub— $\frac{1}{4}$ " sheet; nacelles  $2 \times 1\frac{1}{8} \times \frac{1}{2}$ "; miscellaneous— $\frac{1}{2}$ " wheels, paints, cement, clear dope or varnish, and plastic wood.

*Replica plans of an interesting baby bimotor—Britain's DeHavilland Dragonfly drawn to the  $\frac{1}{4}" = 1'$  scale.*

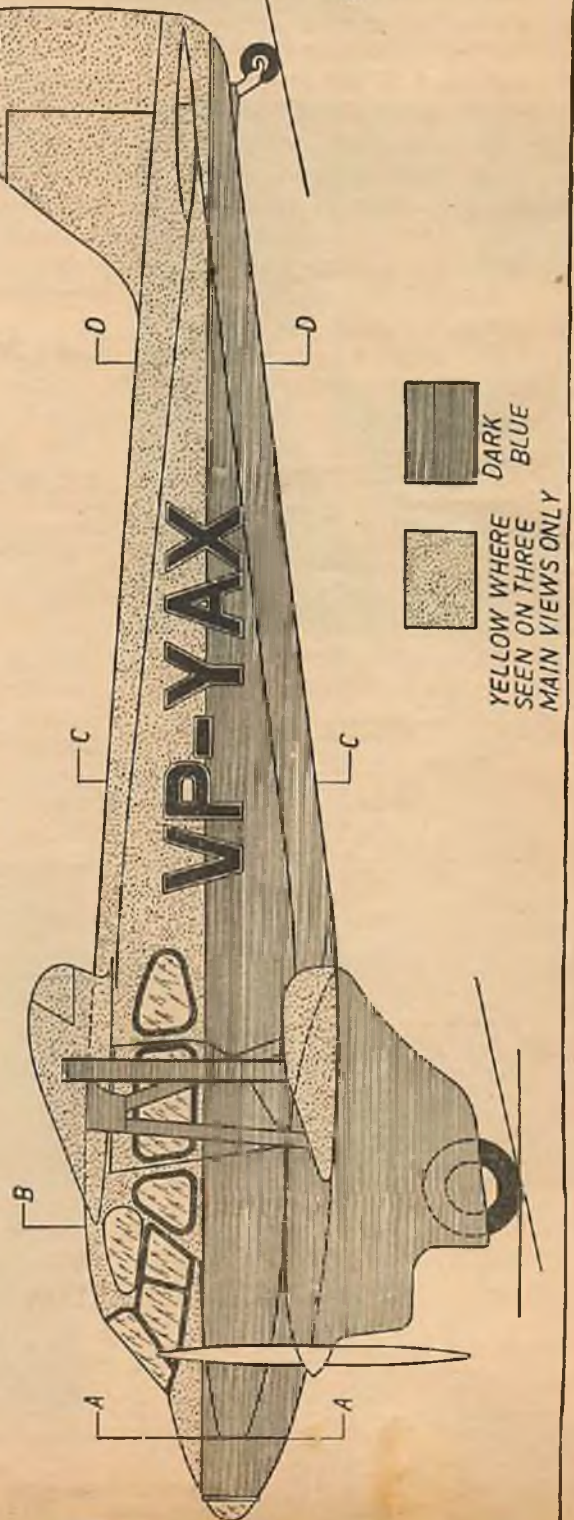
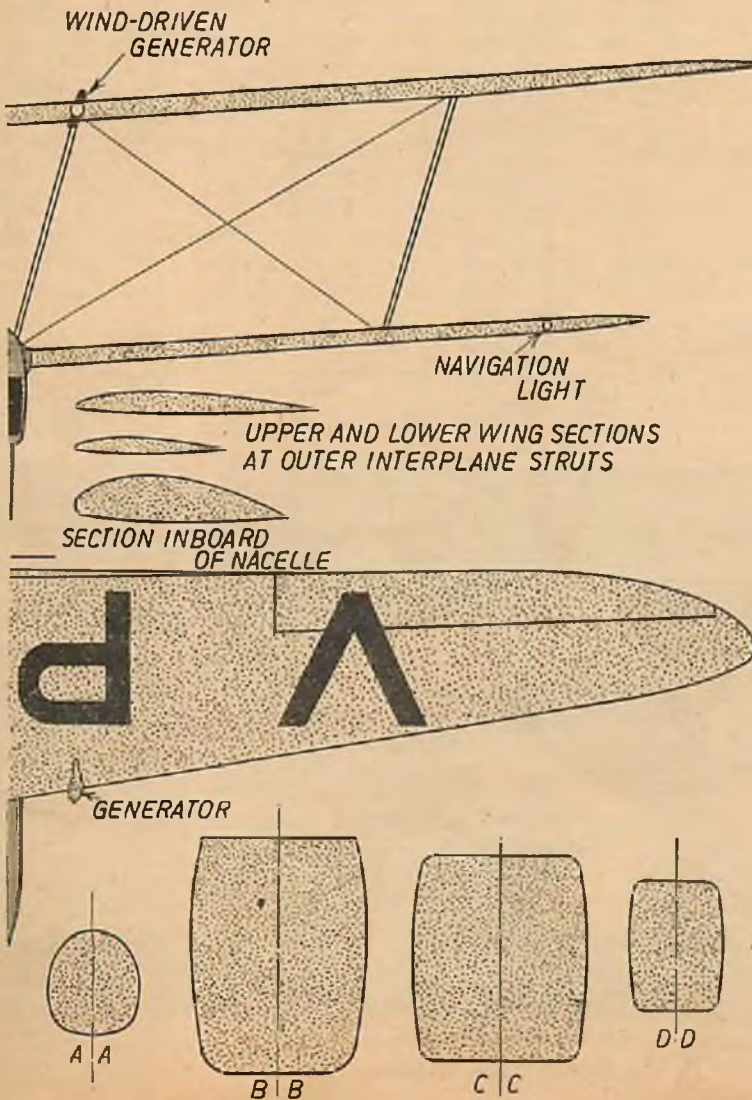






In a steep bank the Gypsy Major-powered Dragonfly displays its beautiful lines.

INNER SECTION OF LOWER WING IS SET IN THE NACELLE CUT-OUT AND FILLETED WITH PLASTIC WOOD  
CARVE NACELLES BY (1) SAWING FROM BLOCK OF THE CORRECT THICKNESS, USING THE PATTERN ABOVE (2) SHAPING TO THE REQUIRED CROSS SECTIONS





*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.)



A Comet gas model by Frank Griffith, Fort Dodge, Iowa.



The new Cyclone engine, details below by request.

## BABY CYCLONE MODEL "E"

The Baby Cyclone Model "E," one of the newest of the  $\frac{1}{4}$  horse power miniature engines on the market to-day, is a recent development of Aircraft Industries, Inc., pioneers in model airplane engine development.

Weighing but 10 $\frac{3}{4}$  ounces, the Baby Cyclone will turn up 6,000 r.p.m. with standard propeller. In tests, engines of this type have been run for 150 hours without parts replacement. This was made possible by the fact that though the engines are built in production, all pistons are hand lapped, and no rings are used. Tiny, fragile piston rings are sometimes employed by model engine builders to avoid hand lapping, but they will last a few hours only before being replaced.

The Baby Cyclone Model "E" has been introduced to the market complete with a new-type, drawn steel motor mount and gas tank in a single unit. The mount is designed to accommodate other engines and previous models of the Baby Cyclone. Cylinders are, of course, air-cooled, and a new set of fins along the top of the cylinder is a Model "E" innovation. These top-cylinder fins, according to factory experts, lower operating temperatures considerably—allowing better lubrication, with consequent easy starting and long life as a result.

The Baby Cyclone Model "E" also inaugurates a new feature—a carburetor mixture control by means of a flexible shaft, attachable in any position on the model. The new model retains old features which have proved popular with model builders, such as the rotary valve system. This rotary valve, standard on racing outboard engines, is the best-known method of operating a two-cycle engine.

At present, the Baby Cyclone holds the gas model championship of France, Germany and the United States. It is adaptable to model motor-boat use, and models built by Baby Cyclone factory technicians attain speeds of 40 miles per hour.

## Contest Calendar

**READERS AND CLUBS.** Notices should be mailed to the Contest Calendar, Air Trails, 79 7th Ave., New York City, at least 5 weeks in advance; news of winners and results immediately after the events.

**SCALE MODEL CONTEST** sponsored by the Scripps-Howard Junior Aviators, and open to all Canadian and American model builders; subject: Maj. Al Williams' Grumman Gulfhawk; no entry fee or previous registration required; contestants to compete under 3 divisions: up to 14 years, 14 to 18, and over 18; \$250 cash-prizes; contest closes March 31, 1938. Cities not having local Junior Aviator Chapters are invited to compete through local model building or N.A.A. groups. Local winners are eligible to enter the finals. Complete information can be obtained from National Junior Aviator Editor, Press Bldg., Cleveland, Ohio.

**FIRST NATIONAL MODEL AIRCRAFT CONFERENCE**, National Aeronautic Association Headquarters, Washington, D. C. Date tentatively set for February.

**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.

**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.

## Gas Modeling in Hawaii

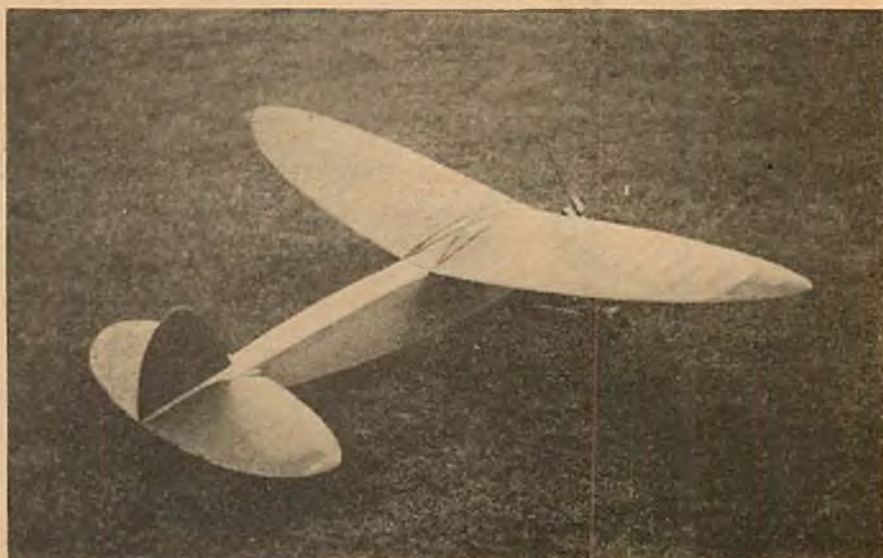
Active and organized gasoline-powered model building is slightly over a year old in Hawaii. But at the first gas model contest held at Wheeler Field, Oahu, on August 29, 1937, over 25 ships of all designs were entered. This entry list surpassed all expectations of the contest committee and plans are already underway for another competition in the near future.

A large crowd of about 2,000 people watched the models perform. For many of these spectators, these were the first gas-powered models they had ever seen. A squad of army M. P.s patrolled the airport and had a difficult time keeping the models and the spectators apart.

Wheeler Field is the home of the pursuit and observation squadrons of the U. S. Army Air Corps and is the largest and most modern of the army flying fields on the Island of Oahu. It is the starting point and also the goal of many transpacific flights. The airport stretches for over a mile in every direction and is an ideal spot for a model contest.

The U. S. army officials cooperated by furnishing timers, stop watches, and cars for following the models. Indeed, much of the success of this contest is the result of the enthusiasm shown by the army.

There were many old-timers at the contest—some who started their modeling back in 1928. Among them were Wah Kwock Chun, San Lum Chock, and



Roy Marquardt, Burlington, Iowa, noted contest builder, had this gas model fly 4 $\frac{1}{2}$  hours on  $\frac{1}{4}$  ounce of fuel.





Above, left to right—Ed Lidgard, Edmund Swort, Marvin Setzke, Dennis Turner, all notable members of the Chicago Aeronuts. Above, right, Bill Atwood, holding the Cyclone-powered California gas model champion. Cowling removed to show installations.

Johnny Lau. The newcomers to modeling are doing nicely—as the contest results indicated.

The contest itself was run on a point basis, determined by the general performance of the model. A group of judges rated each take-off, climb, flight-duration, glide, and landing. The points gained during the three official flights were averaged to determine the winners.

Wah Kwoek Chun won first with 92 points and a flight of 1:51 on a 35-second motor run. He flew an Ohlsson-powered T. D. Coupe. A gold cup was given as first prize. A Cyclone-powered Quaker Flash—owned by George Abili—turned in the best time of the day of

2:10, but placed only second on the basis of points. George won a Pacific Ace kit donated by Barney Snyder of Modelcraft. A Pacific Ace model, flown by Robert Fukuda, won third prize.

Modelers will probably wonder why the famous Hawaiian model weather didn't produce longer flights. Propeller run was limited to about 30 seconds, making long flights practically impossible. This was the proper procedure, since a model would be practically certain to fly away if it gained altitude. The surrounding terrain is mostly pineapple and cane fields and they are favorable for producing thermals.

Most of the models entered were con-

(Turn to page 91)



A twin-tailed gas streamliner by Guston Slezak of New York City.



Above—Gerald Obschleger, Philadelphia, and his Cavalier entered in Quaker City Contest.

Below—William P. Beck, Philadelphia, holding the same model.



Centinella Model Club members: Henry Stiglmeir, kneeling right, Harry Johnson, standing center.



Sidney Wallerstein, qualified as fifth ace of Junior Aviation League. The league has over 2,000 members.



## 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 self-addressed stamped envelope to insure answering.



# Practical Model Design

*How the propeller works —  
concluding the model design series.*

By Frank Zaic

Author of the Model Aeronautics Yearbook

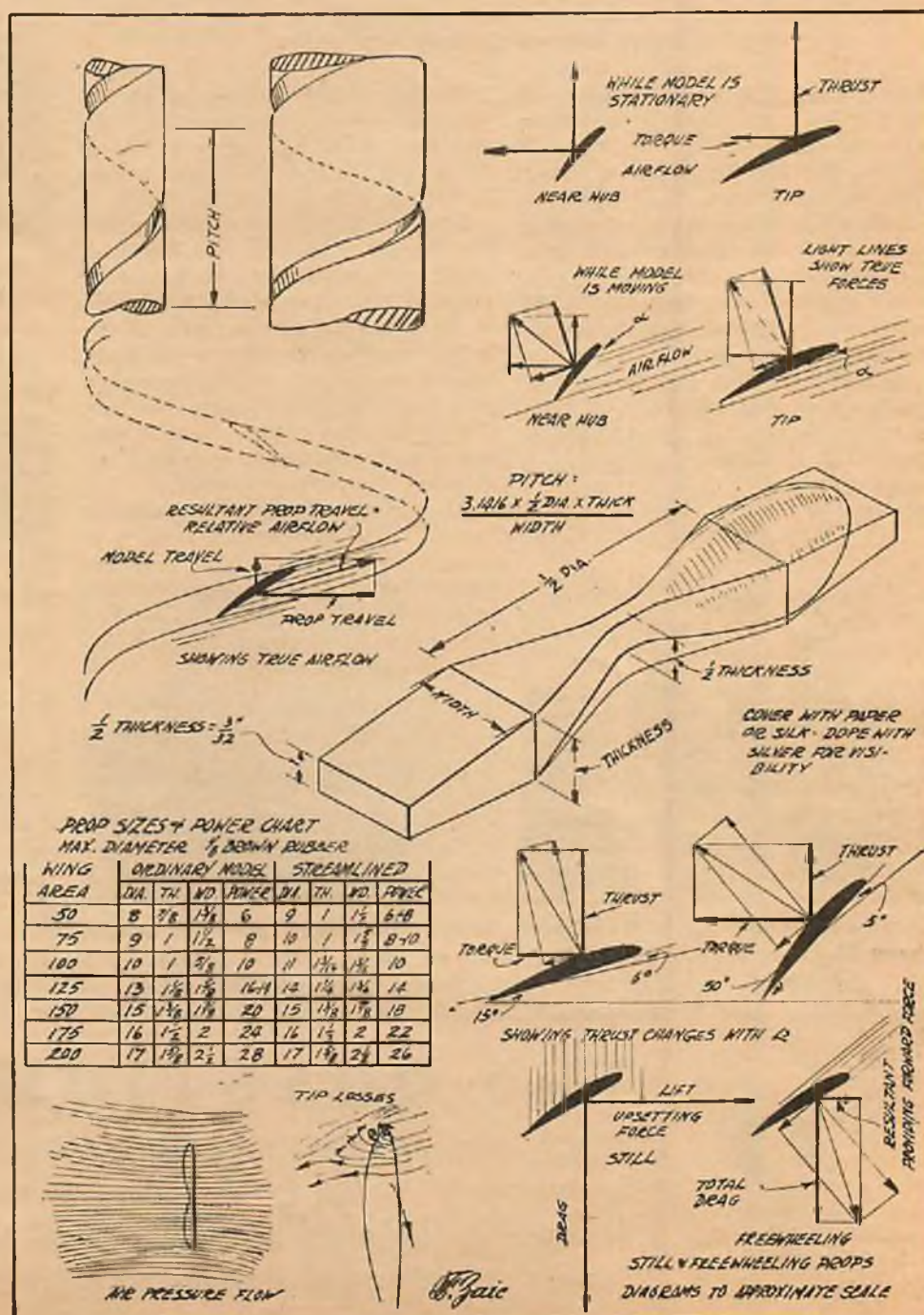
ONE of the cleverest devices invented by man is the propeller. It converts stored energy into motion which has no dimensional limitations. It is comparatively easy to understand its circular-inclined-plane principle when we apply it to a solid object such as earth or wood, and even to such fluids as water. However, when it comes to air, the propeller assumes mysterious properties and we are at a loss to know just how it carries on its business of pulling the plane. We know that it somewhat screws itself forward, but very few of us can correctly proportion the propeller to a particular model.

The propeller is nothing else but a set of rotating wings, and every principle applied to the wing is applicable to the propeller blades. The wing has to have sufficient lift to neutralize the force of gravity, and the propeller has to have sufficient pull to overcome the drag of the model. Because of rotating motion, the blades must be so set that every portion will have a similar angle of attack when the propeller is working at its best angle. This can be easily explained by referring to the thin- and thick-column stairways. If we want to rise the same distance on each stairway with every complete turn we must naturally increase the slope of the thinner helix.

If we were to assume a propeller in a fixed position, but let it rotate like an ordinary fan, the aerodynamical reactions are as shown. Note that the path of the propeller is at right angles to its center line. Since the path of the airfoil determines the air flow, it is only natural that the air strikes the blades also at right angles to the center line. It is rather hard to turn a propeller at this position, since the high angle

produces a large drag which must be overcome by the motor. This naturally slows the propeller down and it explains why we cannot base the propeller duration by winding the model and letting it unwind while in our hands. Of course, we also have a large lift which comes very handy when we launch the ship. The excessive initial rubber power is then nicely taken care of by this combination. Referring to the blade angles we note that there is a large difference in angle of attack between the tip and the hub. The tip has a fair angle, but the hub is definitely stalling.

The moment the model is launched radical changes take place—the most important being that the (Turn to page 80)





## AIR PROGRESS

(Continued from page 4)

Committee is opposed to allowing any other department to take over these lines until they have been put on a paying basis and not relying on mail subsidies.

### AIR FORCES

A squadron of Italian Fiat fighters recently crossed the Andes, from Chile to Argentina, in 40 minutes. It was necessary to reach an altitude of more than 20,000 feet at some points to make a successful crossing. The flight was what was termed a "good-will" tour.

For those who are wondering what the future of the U. S. Air Service is to be, we refer them to Secretary of War Woodring's recent statement that within a comparatively short time the bulk of the air service will be made up of large bomber-fighters. When the full strength has been reached with these bombers, only 500 replacements a year will be necessary to maintain service strength.

Rumania has ordered thirty Italian Nardi F. N. 305 trainers, twenty-four Savoia-Marchetti S.79 bombers and six Savoia-Marchetti S.83 transports. The transports are three-engined machines and said to be capable of 260 m.p.h.

General Craig, Chief of Staff, U. S. Army, has just returned from a visit to Spain. One of the points that impressed him most was the apparent need for an aircraft weapon of greater power than the .50-caliber guns now in general use aboard American aircraft.

The final tests on the Curtiss Y1A-18 twin-engined attack plane have been carried out at Barksdale Field by Air Corps test pilots.

Tests of the army's new stratosphere plane have recently been made under the command of Wright Field pilots. With two pilots and two official observers aboard, the plane was taken to 19,000 feet and flown from Chanute Field to Wright Field, a distance of about 220 miles. During the stratosphere portion of the flight, the plane averaged 350 m.p.h. at altitudes of 19,000 to 21,000 feet. No oxygen or special clothing was required on the trip, owing to the fact that crew and passengers were accommodated in an airtight cabin.

Italy took over another world's speed record on December 6th when Furio Nicolet attained a speed of 344.46 miles an hour in an Italian Breda 88 bomber, which is standard equipment in the Italian Air Service. This record, it should be understood, is a "class" record—not the world's land-plane speed record. Pilot Wurster of Germany holds the world's land-plane record at this

writing with a speed of 379 m.p.h. Many European writers believe, however, that Howard Hughes could beat this mark, if he so desired. They are confident that the British Supermarine Spitfire could better it if the British Air Ministry officials would consent to an official and public speed exhibition.

Five Royal Air Force bombers of the Fairey Hendon type are carrying out a mass flight from England to Australia and back. They will take part in the 150th anniversary of the settlement of New South Wales.

C. G. Grey, noted British aeronautical writer and editor of "All the World's Aircraft," has stated that the air services of the United States combined make up the largest and probably the most efficiently armed force in the world. He also stated that military planes of Germany are equal in power and performance to those of Great Britain and the United States, but were not equal in numbers. He also commented on the fact that many American transport planes, if fitted with guns, were fast enough to "chase most of the world's high-speed fighters out of the sky."

Fourteen giant navy patrol planes left San Diego on December 8th on a 3,080 mass patrol flight to Coco-Solo, Canal Zone. Lieutenant Commander B. E. Grow, who was in charge of the flight, said that he expected the flight to be completed within twenty-six hours.

Bombing planes were brought into action in the Philippines recently when government troops were engaged with Moro outlaws in the Lanao Province. Each bomber carried five twenty-five-pound bombs. These were only intended for use in an emergency. Ten government soldiers were wounded and one killed in capturing the outlaws' main strong point a week before.

### RECORDS AND REMARKS

The British Flying Boat *Centaurus*, a new version of the Empire boats, began a 30,000-mile survey flight from Southampton, England, to Australia on December 3rd. It is understood that its commander, Captain J. W. Burgess, is mapping a new England-to-Australia air-mail route.

Major Alexander P. de Seversky put up a new record for a flight from New York to Havana, Cuba, when he covered the distance in 5 hours 3 minutes on December 3rd.

Two American air-racing pilots of high rank were killed at the All-American Air Maneuvers held at the Miami municipal airport on December 3rd. They were Rudy Kling, who won the Thompson Trophy at the last National Air Races and Frank Haines, of Detroit. Both airmen lost control of their machines while banking around

a "scattering" pylon a short distance from the take-off. S. J. Wittman won the event.

Miss Jacqueline Cochrane of New York set a new New York-to-Miami record a few minutes before this double crash, averaging 278.13 m.p.h. for the flight.

Andre Japy, French airman, was credited with a new long-distance record for light planes on December 1st when he flew from Marseilles to Jibuti, French Somaliland—a distance of 3,300 miles, nonstop in 20 hours, 55 minutes. He used a 100 h.p. Caudron "Aiglon" plane and 2,400 miles of his trip took him across the Mediterranean and Red Seas.

A new section of the new Tempelhof Field at Berlin was recently opened by



Douglas XTBD-1, Twin Wasp.

Colonel General Hermann Goering recently. The new airport will be completely remodeled by 1939 and German reports say that it will be the largest airport in the world. The air terminal itself will be three quarters of a mile long. One subway line connects the field with Berlin proper and another will be built within a year.

Another Empire flying boat, the *Cygnus*, has crashed, killing two.

It has been reported that 113 military planes have been kept in constant use by the Italians in Ethiopia, to keep down the constant uprisings of Abyssinian natives who are making the most of the rainy season to raid Italian outposts.

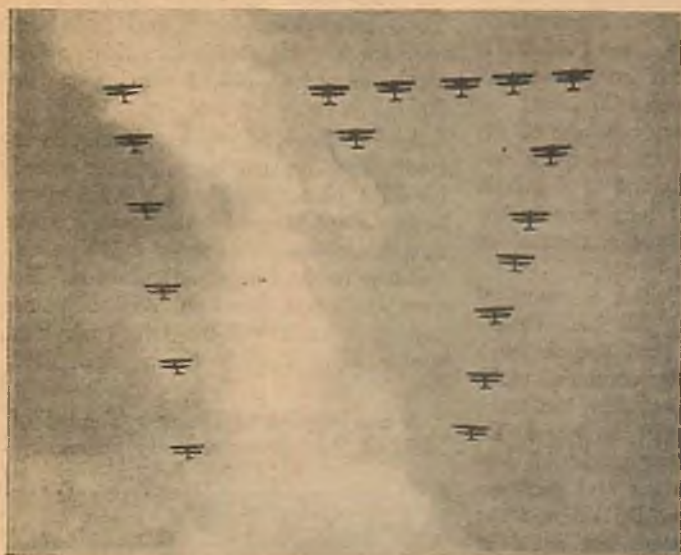
Plans for the creation of a memorial to Amelia Earhart in the form of a national foundation to serve the cause of women have been announced by the officials of Thiel College, Greenville, Pennsylvania. It is believed that \$500,000 will be required to carry out the plans.

General Pershing and Major General Adelbert de Chambrun of the French Army were among those who took part in the memorial service held in tribute to Norman Prince, an American volunteer, who served with the French in the World War and died in an air engagement. The service was held at the Washington Cathedral on December 6th.



# MODERN MILITARY AVIATION

(Continued from page 18)



A formation of  
Curtiss Hawk  
P-6Es.

yes. But it must also be maneuverable and easy to handle to keep its place in the many intricate formations so necessary to up-to-date pursuit tactics. It must offer good all-around vision for the pilot. It must be suitably armed and the guns must be so arranged that the pilot can remedy all forms of gun stoppages under all conditions. It must have a reasonably slow landing speed and a normal cruising speed that maintains a fair relationship with its "top" speed. It must use a power plant that is easy to service under active service conditions. It must be so built that repairs can be made quickly and efficiently. It should, whenever possible, have interchangeable parts for quick rebuilding. The ship that fits the service hangar routine will be the most useful if war conditions actually arise.

Speed is essential, of course, for more reasons than one. But any pursuit plane which can offer nothing but speed will not be in the fight very long, for its speed will carry it quickly to destruction, unless it has maneuverability to hold its station during air combat. It must also be remembered that only

on very rare occasions will the 300-mile-an-hour fighter be flown at 300 m.p.h. Such a speed is not economical to start with. The engine will soon burn out and the pilot will suffer abnormal fatigue. In that state he cannot be expected to carry out his duties with all his faculties functioning.

That there is a vast difference between top speed and cruising speed can best be realized when we explain that the 200 m.p.h. top speed of the transatlantic Clipper ships is usually cut to about 128 cruising speed. If we take eighteen 300 m.p.h. pursuit ships and expect to put them through the intricate formations and maneuvers expected of them, the leader will have to see that his normal speed is somewhere near 225, rather than 300. So the true working speed of the modern pursuit is considerably lower than its boasted top speed.

The matter of armament is another item of great importance. We like to look at photographs and point out the many gun positions of the "latest fighter." Except under abnormal conditions, such as ground attacks on

strong points, it is the general belief of those who should know that two guns are all one man can care for. To-day we see single-seaters, or pursuit ships, that are loaded down with as many as six.

At the best, and the arrangement is none too satisfactory, four guns can be mounted under the cowlings where the pilot can get at them. Machine guns, strange as it may seem, still stop firing, either because of mechanical trouble or (more often) because of ammunition faults. Two guns are plenty to take care of, as the writer has experienced on too many occasions. How one man can take care of four is more than my imagination can assimilate. If, on the other hand, two guns are mounted well away from the cockpit, out of reach of the pilot, I wonder by what form of sleight of hand he manages to clear stoppages.

I have studied these guns and the somewhat complicated arrangement of control cables and gadgets by which they load, fire and clear stoppages. So far, I have been unable to see how one man, unless he is well trained over a period of many months, can efficiently manage such a ship. Frankly, I do not know all the inside of modern training, and perhaps the control mechanism is more workable than it appears on the surface.

I was talking to a noted designer only recently and he stated that most pursuit ships to-day were too complicated in mechanism to be worth their place in an active service squadron. It would take too much time to carry out necessary repairs, adjustments and parts replacements. I do not know how much this means in 1937, but I do know that it was a great field problem in 1917 and 1918.

In general, the United States has never been particularly strong for this multi-gun business. But with the spread of the idea abroad, it is natural that designers here should attempt to copy it to satisfy those who do the buying. American pursuits, armed with the



Consolidated navy patrol bomber XPB2Y-1, four 1050 h.p. Twin Wasps.



modern Browning gun, are creditable performers.

How high the United States ranks in pursuit aviation is a question. Actually, I have no official basic figures to work on. I know but few performance figures on any first line craft, either here or abroad. As I stated before, we are prone to judge on actual speed rather than maneuverability and fitness for active service conditions. Most certainly, American pursuit pilots enjoy the finest of training under ideal conditions where money is the least of considerations. They get a lengthy period of sound groundwork, plenty of primary flight training and a fair share of squadron service time.

Then again, owing to our fortunate geographical location, the service training schools are generally located in sections of the country where reasonably good weather and topographical conditions are ideal for primary training. Then, with the vast area, there are other sections where winter conditions are available for certain types of airmanship and all-weather navigation. There are torrid belts where an entirely different set of meteorological conditions are to be found and mountainous country which demands the best in navigation and airmanship. Thus American aviators are particularly fortunate in the general location of the country.

The service equipment is of high caliber. Probably no country in the world has such a wide selection of single-seater craft to select from, and the equipment *should* be of high order. At the present time, U. S. Air Force Pursuit squadrons are equipped with the following types of single-seater craft: Curtiss P-6A equipped with the Curtiss V-1570 Conqueror engine, the Boeing P-12F fitted with the Pratt & Whitney Wasp, the Boeing P-26A powered with the Wasp engine, the Consolidated single-seater fighter and the Consolidated PB model two-seater powered with the Wright V-1570 engine.

This last sentence may be somewhat misleading to some readers. But one or two pursuit squadrons which were originally equipped with single-seaters have been re-equipped with the Consolidated two-seater fighters and still retain their general rating as pursuit squadrons. To many, this move is regarded as the next step toward the disbandment of all pursuit (single-seater) squadrons, although this cannot be substantiated by reports from Air Service headquarters. Still, it is an interesting point to consider.

Our readers will probably point out that there are faster single-seaters in our Air Service. There are, but they have not reached squadron strength as yet. The Seversky P-35, shown at the last New York air show, has been held up in production because of certain

changes that have had to be made in the wing construction and at the same time the firm is literally swamped with foreign orders.

On the other hand many pursuit squadrons will soon be equipped with the new Curtiss Hawk P-36 pursuit ship which, according to Curtiss publicity, is equipped with four guns, two of which are fitted in the wings.

I should explain here that my previous statements concerning multi-gun ships are my own personal opinions and as such are open to question. It may be possible that the Curtiss designers have developed gun-control equipment which is efficient and simple in action. If so, it is well worth keeping on the secret list, and far more important to cover up than an extra fifteen or twenty miles an hour.

I do not wish to convey the idea that multi-gun planes are not adaptable for modern military aviation practice. They have their place in the great race for air power. They have been designed to attempt to overcome the fire power of the modern bomber. Unless we try them out and put them into the hands of men who are willing to try them out, we shall never know whether they are worth their place on the line.

Perhaps the new Curtiss Hawk P-36 is the answer. Perhaps the Seversky may turn the trick. The Curtiss carries a 1,000 h.p. Wright Cyclone engine and a constant-speed feathering propeller. It carries in addition to its four guns, eight light fragmentation bombs and probably does a speed well up to or over 300 miles per hour.

The illustration accompanying this article is based on the Consolidated PB-2A pursuit ship, regulation equipment in one or two service squadrons. I have tried to show you how the modern airplane is built and where all the mysterious parts we hear so much about have been placed. The information contained in the drawing has been laboriously gathered from sources believed reliable.

It was drawn to show just how the modern pursuit is built and the many unseen parts are disclosed. It shows how the pilot sits in relation to his various controls, motor and machine guns. It shows the position of the variable-pitch propeller control and the handle and ratchet device which raises and lowers the undercarriage when the electric control fails.

The drawing also contains a detailed illustration of a modern, fixed machine gun. This is the Browning gun made at the Colt Firearms Co., in Hartford, Connecticut. In subsequent issues I hope to show the movable or observer's gun and some detail of its mechanism.

The next article in this valuable series will appear in an early issue.—EDITOR.



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- It has won for others and it will win for you.
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<input type="radio"/> ALABAMA \$1.50	<input type="radio"/> ALABAMA \$1.50	<input type="radio"/> ALABAMA \$1.50
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# EARMARKED GOLD

(Continued from page 41)

I took this Reynolds thing in my stride and turned it over to Red and forgot about it. It merely looked like a routine investigation to me to be sure that there was no chance of young Reynolds being alive. What would you have done?"

"The same thing you did, probably," Shorty said. "But what do you say we give this Reynolds gal a ring on the phone and maybe ask her some questions? I'd like to know why she lost interest as soon as Red started off."

Bill reached for a Manhattan telephone book, turned the pages, and then took the telephone out of its cradle. He gave the Barnes Field operator a number and pressed the instrument to his ear.

"Ask her," Shorty said, "if she has heard from Red."

Bill nodded his head and a moment later spoke into the mouthpiece.

"Hello, Miss Reynolds?" he said.

"Who wishes to speak to Miss Reynolds, please?" a soft voice said in his ear.

"I recognize your voice, Miss Reynolds," Bill said. "This is Bill Barnes speaking."

"Just a moment, Mr. Barnes," the voice said, "I will see if Miss Reynolds is in. I—"

Bill heard a receiver click and another woman's voice cut into the conversation.

"Who is on the phone, please, Miss Johnson?" the second voice said.

Bill's forehead creased in long, sharply etched lines as a receiver clicked again and no one answered the inquiry. He waited for a moment and then he spoke.

"Hello, hello," he said. "I am trying to get Miss Ruth Reynolds on the wire."

"This is Miss Reynolds speaking," a voice said that Bill had never heard before. "Who is this, please?"

"Who was on the wire a moment ago—on an extension, perhaps?" Bill asked quickly.

"It must have been my secretary, Miss Johnson," the voice said. "Will you kindly tell me who you are?"

"Bill Barnes!" Bill barked. "I want to speak to Miss Reynolds!"

"You are talking to Miss Reynolds, Mr. Barnes," the voice said. "What do you wish?"

"Don't you know me?" Bill asked. "I mean don't you know who I am?"

"Of course I know who you are, Mr. Barnes," she said. "But I don't know you."

"Did you come to my field on Long Island about a week ago, Miss Reynolds,

and ask me to make a search for your brother?" Bill asked.

"I have never been on your field, Mr. Barnes," she said. She heard Bill's explosion of breath and added, "What is wrong?"

"Plenty," Bill snorted. "Miss Reynolds, will you please stay in your apartment until I arrive there? I'm going to take off from my field immediately and land at the seaplane landing at East Thirty-first Street. Your apartment is about Sixtieth Street, isn't it?"

"I was just going out," she said. "Can't you tell me—"

"I'm sorry," Bill said. "I can't tell you anything over the telephone. But you will be very interested in what I have to tell you and what I have to show you when I arrive in about twenty-five minutes. Good-by."

His face was a thundercloud as he slapped the telephone into its cradle. He lifted it off again and asked for "Scotty" MacCloskey, the dour old Scotsman who was the major domo of Barnes Field.

"Warm up the Lancer, Scotty," he said. "I'll be out in a few minutes."

"There seems to be something wrong," Shorty said.

"There is, wise guy," Bill snapped in his exasperation. "Get out of that over-all and grab a hat. We're going over to call on Miss Reynolds. She says she was never here."

## III—A MESSAGE

EIGHT minutes later Bill climbed in the forward cockpit of the big silver sesquiplane that was the Lancer.

Following his regular custom, he checked over his ammunition counters and his two .50-caliber machine guns and the 37mm. cannon mounted in the Vee of the cylinders.

"Let's ride!" he said into the inter-cockpit telephone to Shorty, and released his hand brakes.

He blasted the tail around and rolled down the concrete runway at terrific speed until he reached the center of the field where the various runways converged. Kicking his right rudder gently he nosed into the wind, rocked his control column gently forward to bring up the tail and then lifted the big ship into the air.

The tip of Brooklyn and the Brooklyn Bridge flashed under his wings a few minutes later. He sped above the other bridges that span the East River, circled the seaplane landing once and struck the water with a cloud of spray and roared up to the inclined turntable. A uniformed attendant wheeled up a set of steps. As Bill went down them he

shouted instructions at the attendant and raced toward the taxi stand with Shorty by his side.

"If we don't get there fast, she won't wait," Bill panted as he gave the driver the address and slumped back in the seat of a taxi.

"That kind never will," Shorty said.

A maid answered the door and led them into the library of the Reynolds' twenty-room apartment.

"Please sit down," she said. "Miss Reynolds will be right in."

But Bill didn't sit down. Instead, he paced back and forth across the room. He was waiting to get a glimpse of Miss Ruth Reynolds. He heard the tap of high heels on the floor and faced the doorway. A short, rather stout girl of about twenty-six stepped into the room.

Bill's heart turned over and his stomach contracted as he stared at the girl who stood there. He knew he was being rude, but he couldn't help it. He opened his mouth, but no words came forth. He bowed his head for an instant to hide the anger and chagrin in his eyes.

"Mr. Barnes?" the girl said in a languid, bored way that made Bill more angry. He bowed again.

"And Mr. Hassfurth," he said, indicating Shorty. "Miss Reynolds, unless she has already gone, call your secretary quickly!"

Miss Reynolds' eyes opened wide and her left hand fluttered toward her heart. "Why, really—"

"Please!" Bill snapped. "I should have told you over the telephone that I recognized your secretary's voice as the voice of the person who called on me last week and said she was Miss Ruth Reynolds."

Bill jabbed a hand into an upper waistcoat pocket and pulled a folded piece of paper from it. He spread it out under Miss Reynolds' gaze and said, "She left this with me."

Miss Reynolds stared at it for a moment and reached for a bell lanyard beside the doorway.

"Is that your signature?" Bill asked. She nodded her head.

"Tell Miss Johnson I wish to see her here at once," she said to the uniformed maid, who appeared silently.

"Will you please tell me more about it before she comes," she then said to Bill.

Bill told her the same things he had told Shorty a short time before, running his words together in his haste to finish before Miss Johnson appeared.

But he needn't have hurried. The maid came back in a few minutes to say that Miss Johnson was neither in her office nor in her room.

"It looks, Miss Ruth," the maid said, "as though she had gone and had taken all her things."



"That will be all, Patricia," Miss Reynolds said. "What in the world," she said to Bill, "can be the object?"

"That's what I'm going to find out," Bill said grimly.

"She didn't even know my brother."

"How long had she been with you?" Bill asked. "Where did you get her? Who recommended her?"

"Just a moment," Miss Reynolds said. "I'm frightfully bewildered already. Let me think." She closed her eyes and tried to rub the creases out of her forehead with the tips of her fingers.

"She had only been with me a short time," she said. "Four weeks, perhaps. I can find out."

"Never mind now," Bill said. "How did she happen to get the job?"

"A—a friend sent her to me," Miss Reynolds said. Her eyes were a little frightened now.

"An old friend?" Bill persisted.

"No," she said. "I scarcely knew him. I—I met him—I see now I shouldn't have taken her—I met him at one of the fashionable night clubs, at a party. I don't remember much about him except that he was very charming. We were talking about the unemployed, and—"

She started as Shorty grunted, his eyes flashing. Bill glared at him.

"I told him I had been having a frightful time getting a competent secretary, and he said he knew of one he could send to me," she went on.

"He would have said the same thing if you had wanted a personal maid or a cook," Shorty broke in.

"But why?" she asked.

"Because your brother cracked up in the Bering Sea last summer," Shorty said. "He wanted to get Bill, or Red, or all of us up there."

"I don't follow that," she said. "He told me this Miss Johnson came of a very fine old family. Her family had lost all their money in the crash and she was working as a social secretary to pay her way. I wanted to help her. She was very capable."

"If you had wanted a pocket picked she would probably have done that very well, too," Shorty said. "She was a plant."

"But why?" Miss Reynolds wailed again.

"We don't know that yet," Bill said. "But we do know that one of my men is in very grave danger. You see, we don't live the same kind of life you do. Now we've got to find the answer to this one." He handed the signed, blank check to her. "I would advise you to be a little more careful about what you sign."

Miss Reynolds' face turned a bright crimson.

"If there is anything I can do," she

began as the maid came back into the room.

"Some one wishes to speak to a Mr. Barnes on the telephone," she said. "The person says it is very important."

Miss Reynolds pointed to a telephone that stood on a table. "Use that extension," she said.

"Hello, Bill," Tony Lamport's excited voice said in Bill's ear.

"Yes, Tony. What is it?"

"It's Red, Bill," Tony said. "He just made contact with me. There was something very peculiar about it. He talked as though he was under wraps—as though some one was telling him what to say. He said he was down off the Alaska Peninsula and had smashed his radio when he crashed. He said he just got it fixed so that he could contact



Miss Johnson

us. He managed to get to a small island and gave me the position of it."

"What else?" Bill asked tensely.

"That was about all," Tony said. "His voice kept getting lower and lower and then faded out entirely. I've been standing by constantly trying to pick him up again. But he hasn't come in again."

"O. K.," Bill said. "I'll be back there in a little while."

"Oh, one other thing he said," Tony said. "I didn't get what he meant. He said something about watching your nozzle injectors on your Diesels when you come after him."

"Did you write that down?" Bill asked.

"Yes. I took the whole thing down."

"Tell Scotty to check over the transport, the Eaglet and a Snorter," Bill ordered. "I'll be back there soon."

He put the instrument back in its cradle and told Shorty what Tony had told him. Little furrows gathered between Shorty's eyes as he listened. Miss Reynolds watched them both breathlessly.

"He's in a jam," Shorty said. "Some one was standing over him while he

talked—some one with a gun in his hand."

"A gun?" Miss Reynolds said.

"Good-by, Miss Reynolds," Bill said. "I'm sorry if we've startled you. I'll let you know about this thing later."

"Please do," she said. "I'm afraid you'll think I'm awfully stupid."

"Not awfully—extremely," Shorty said under his breath.

They were on their way back to the seaplane landing in a taxi when Shorty suddenly slapped Bill hard on the knee.

"I've got it!" he said. "Nozzle injectors! Red was warning us that he was in trouble."

"I don't get it," Bill said.

"Remember the code word we arranged when I went out to the Philippines on my own? Remember, we took the name of the largest island, Luzon, and changed it around, spelled it backward? N-O-Z-U-L. Then we called it 'nozzle.' That was to be the code word I would send you if I got in a jam. And you came when I sent it."

"I remember now," Bill said grimly. "That's the explanation all right. Smart boy, that Red."

"Too smart to leave there," Shorty said.

"Leave there!" Bill roared. "Fellah, we're shoving for Alaska as soon as Scotty is through checking over our ships!"

#### IV—OFF FOR ALASKA

BEVERLY BATES, the brown-eyed Bostonian, who was the fifth member of Bill's little squadron, was waiting on the apron with Scotty MacCloskey when Bill and Shorty killed the engines in the Lancer.

"What about Red?" Bev asked as Bill slid out of the Lancer.

Bill saw the same expression of desperate concern in Bev's eyes that he had seen in Shorty's when he told him about Red. He knew the thoughts that were in the back of both their minds. He knew they were thinking about the two tragedies that had broken the long period of good fortune which had attended Bill and his squadron since its conception. They were thinking about Mort Henderson and Cy Hawkins—wondering if Red Gleason was to be next.

What, Bill asked himself before he answered Bev, is behind this thing? Is it some one who is trying to even an old score with Red, or are they striking at me? He shook his head angrily and answered Bev.

"Come into my office," he said. Then he turned to Scotty MacCloskey.

"You've got your men on a Snorter and the carrier-transport?" he asked.

"Yes," Scotty said. "But you didn't tell me about equipment. I don't know where you're going."

"Alaska," Bill said. "Arrange for a



supply of fuel in Seattle and find out whether we can get more in Juneau, Alaska. Double the emergency equipment and ammunition supply. Put the regular crew in the carrier. Be sure to check Sandy's ship carefully. We may need her. How soon will they be ready?"

"I ought to have a couple of days to be sure, Bill," old Scotty said cautiously.

"A couple of days!" Bill roared. "You mean a couple of hours! Check the Lancer, too. Shorty will fly her. Bev will have the Snorter. Sandy and I will handle the carrier-transport. Make it three hours. I want 'em on the line then."

Scotty MacCloskey spread his hands and shrugged his shoulders. He was a careful man and he wanted to be certain that the ships were ready. But he knew there was no use in arguing because Bill knew the condition of his ships as well as he did.

A few minutes later Bill, Shorty, Bev Bates, and young Sandy leaned over a chart spread out on a drawing board in Bill's private office. Shorty spread a caliper and laid it on two points along the string of mountainous dots that were the Aleutian Islands.

"From what I find," Shorty said, "it's one of those small ones between Rat and Andreanof Islands. It is almost directly on the route the *Graf Zeppelin* took on its world flight across the Pacific in 1929."

"What about steamship lines?" Bill asked.

"It's about a hundred miles north of the Yokohama-Vancouver lane and four hundred north of the Yokohama-San Francisco route," Shorty said.

"Listen, Bill," Bev Bates broke in, "have you formed any opinion about this thing? Have you any ideas?"

"No," Bill snapped, "I haven't."

"Do you think young Reynolds' attempted flight to Russia has anything to do with it?" Bev asked.

"No," Bill said. "That was just one of those stupid gestures that do more to harm aviation than to help it. It wasn't a drunken flight as the newspapers intimated. It was quite thoroughly planned. But it had no purpose. Like a lot of other people, young Reynolds wanted to get himself some publicity. Some one wants to get us up there and is using this method to do it."

"What for?" Sandy asked, his freckled face serious.

"Hell, kid," Bill said, "I'm no gray-bearded oracle."

"Say, Bill," Shorty said, "you didn't ask Ruth Reynolds about the man who sent the phoney secretary to her. Maybe, if we could locate him, we could get a lead."

"I thought of it," Bill said, "but decided against it. She said she met him at a party in a night club. That was part of this game. He was supposed to meet her and plant that girl in her house."

"I don't get it," Bev said. "Why all that elaborate planning if Reynolds or his sister have nothing to do with it?"

"They *do* have something to do with it," Bill said. "They served some one as an authentic and reliable background to get Red up there so that some one could grab him. They want us up there, too. They knew that we would come after Red. It's a clever little trap."

"Anyway, we'll be ready for them," Shorty said.

"I hope so," Bill said and reached for a telephone. He asked to be connected with Scotty.



Amphibian version of the Curtiss Jr.

Barnes Field was a bedlam of feverish activity when Bill and his men went out on the apron at dusk. The sixteen-foot props of the big carrier-transport gleamed dully as Martin, the head mechanic, blasted the three thousand horses in the two Barnes-Diesels. The twin props of the Snorter and the silver Lancer were ticking over slowly on the apron beside the transport. The goggled, white-helmeted heads of Shorty and Bev Bates jutted above the rims of the two fast amphibians a moment later.

Bill climbed into the commander's seat of the bomber-carrier with Sandy just behind him. He flicked the inter-cockpit telephone switch and checked Bailey, the bomber and machine gunner, in the forward cockpit; McCoy and Neely in the cockpits abaft the engines; Miles, who rode down under the belly of the ship in the retractable gun pit when they went into action; and old Charlie, the cook, who operated the gun in the extreme tail.

Above and behind Bill's head was a circular platform on which was mounted a rapid-firing one-pounder that could throw over one hundred shells in a minute.

In the midship section of the big amphibian was the hangar of the Eaglet, Sandy's fast little fighter. Suspended by its landing hook from an overhead girder, the Eaglet was locked rigidly in place on the girders, and hung with its cockpit just above the level of the deck.

Behind the Eaglet's hangar was a retractable machine-gun turret that could be lowered below the bottom of the fuselage. Farther back were showers, lavatories, and Bill's private cabin—also a dining salon, with seats that could be converted into berths for the crew. In the tail was the galley, with an electric stove, ice box, and storage closets.

On the bridge of the monster were dual controls, a Sperry automatic pilot under the commander's seat, wireless

equipment, a new Kreusi radio compass "homing device" and every other known navigation instrument.

From the bridge and pilot's compartment steps led downward to a machine gunner's cockpit in the nose, mounted with a .50-caliber Browning. Beneath the gunner's feet were bomb releases. In each of the wings, abaft the engines, were inclosed machine gunners' pits similar to the one in the nose. A runway connected these two cockpits with the main fuselage. The big ship was a carrier, a bomber, a flying fortress all in one.

Bill smiled as he switched on the two-million-candle-power landing lights of the "BT-4." An instant later the transverse bands of yellow-and-black pigment painted across the runways became visible as the huge floodlights were turned on in the traffic tower. He slipped his boots into the rudder stirrups and gunned the engines as Scotty MacCloskey went out the port gangway.

The monster transport rolled down the runway like some huge, prehistoric animal. Two hundred yards from the electrically wired fence surrounding the field, Bill eased back on the wheel and



took the ship into the air in a long, low climb.

Far off to the right the spires and turrets of New York's lighted skyscrapers gleamed above the city as Shorty whipped the Lancer down a runway and into the sky, followed by Bev Bates in his Snorter.

"Level off at ten thousand and take a position on each side of me," Bill ordered over the radiophone. "I'll give you our course in a few minutes."

The hum of their engines changed as they adjusted them to cruising speed and Bill gave them their course. The million and one lights of New York disappeared behind them and the world ahead became a black void. Hour after hour the three ships droned on and on through the cold night air. From time to time Bill played the beam of a large spotlight on the port and starboard motor nacelles, the props, and the wing surfaces. As the spotlight snapped off, the exhaust pipes glowed deep red and the port and starboard running lights blinked to life.

They had all set their automatic pilots to work and both Bev and Shorty were half asleep when Bill altered their course over Salt Lake City.

"We'll get a few hours' sleep at Seattle and have 'em refuel the ships," he said to his men. "I want to take that long hop up the coast and across the Gulf of Alaska during daylight. We've got to have our eyes open."

## V—DUEL

AT eleven o'clock that same morning they were back in the air again. But they had had several hours' sleep in the beds of a good hotel and a morning meal that was both large and good.

"How in the name of your aunt Hester's pink donkey does he do it?" Shorty asked Bill as he watched Sandy stow away food. He was eating with the gusto and appreciation of a seventeen-year-old appetite.

"He must stow some of it away in an auxiliary tank," Bill said, grinning.

Sandy started to answer with his mouth full but he couldn't speak. Instead, he thumbed his nose at Shorty and went on with his eating.

He was half asleep in the co-pilot's seat of the transport when Bill roused him from his reverie.

"I want you to take the Eaglet out, kid," Bill said.

"Swell, Bill!" Sandy said. He leaped to his feet and started toward the Eaglet's hangar.

"Hey! Wait a minute. Come here!" Bill shouted at him. "Sit down a minute and I'll tell you what I want you to do."

"O. K., Bill," Sandy said. But he regarded Bill suspiciously. He knew this might be a stall on Bill's part to take him, Sandy, out of danger. He

knew Bill had been jittery ever since the deaths of Mort Henderson and Cy Hawkins, and this wouldn't be the first time that Bill had sidetracked him to keep him from actual combat.

"I want you to take the Eaglet out," Bill said, "and when we get a little north of here, near the northern tip of Queen Charlotte Island, I want you to take a run up to Juneau and see what you can find out at the airport. Red made a landing there. Get hold of the airport manager. Tell him who you are and find out what Red had to say to him."

"I don't want to send Shorty or Bev because we may run into some trouble a little later in the day and I'll need them. Things are going too quietly. If some one wanted to get us up here they've succeeded, and hell may pop any time."

"I knew it!" Sandy said, pointing his finger at Bill. "You're trying to sidetrack me! You know we may run into trouble and you're trying to get me out of the way. I can hold up my end any old day in the week, Bill. I——"

"Shut up!" Bill roared at him. "I'm sending you because you can slip in there and out again in the Eaglet without being noticed. If I send a Snorter or the Lancer, the whole world will know it." Bill's face was flushed with anger. "I want you to learn to obey orders, kid. I know you can hold up your end and I'm not trying to sidetrack you. You may run into plenty of trouble yourself. Now hop to it!"

"O. K., Bill," Sandy said. "I'm sorry I——"

"That's all right," Bill said trying to hide a grin. "Get on it!"

Sandy was on his feet in an instant, his face glowing with anticipation. In another minute he was in the cockpit of the little fighter that had been literally built around him and was fastening his safety belt.

Bill throttled his engines as Sandy waved a hand at him and signaled to Miles to throw the switch that would bring the powerful suspension gear into play.

As Miles threw the switch, the floor of the transport divided into two segments and swung downward. Then the telescoping crane supporting the tiny Eaglet slid through the opening in the fuselage.

When the little plane was about twenty-five feet below the undercarriage of the carrier, Sandy turned a crank that operated a high-speed worm manipulating the folding wings. There was a mechanical click as the locking lugs turned; then the wings began to turn on their hinges. Another click and the gull-type wings were locked in flying position.

Bill's forehead was covered with cold, clammy perspiration. He couldn't ever

get over the idea that it would be his fault if something went wrong with the mechanism and Sandy was hurt in one of those take-offs.

He held the ship steady while he waited for the first blast of Sandy's engine. As the roar of the powerful eight hundred and thirty h.p. Twin Wasp joined the crescendo of the two supercharged Diesels of the transport, a smile flitted on his lips. His tanned face wrinkled with pride.

"The kid has what it takes," he said to himself as the Eaglet dropped away.

Bill flipped the switch on his radio panel and chanted Sandy's call letters into his microphone.

"Nice going, kid," he said when Sandy checked back. "You know what I want to know. Just nose around. But keep your own mouth shut. You'd better load up your tanks again before you leave there. Keep in contact with me. I'll let you know our position as soon as you get away. You'll have about an hour's run up there. Then you'll have to give it the whip when you leave. You'll be over open water, so keep in contact."

"O. K., Bill," Sandy said. He brought the Eaglet around on one wing, kicked its tail in the air like a bucking broncho and laid the nose on the capital of Alaska.

An hour later he was talking to Martin Cassidy, the red-faced jovial manager of the airport. He remembered talking to Red Gleason the week before.

"I knew Red in France during the War," he told Sandy. "He's an old pal of mine. Has anything happened? He said he would stop in to see me on his way back. He just refueled and shoved off for Nome. I had a little trouble getting juice for those Diesels."

"No," Sandy said when he had an opportunity to speak. "nothing is wrong. I'm supposed to join him up here and I haven't been able to make contact with him yet. I thought he might have told you something definite about his plans."

"He didn't," Cassidy said. "But you better drop down at Whitehorse and Flat before you get to Nome. They may know something. What are you fellows doing up here?"

"Just a survey for the government," Sandy lied. "I'd like to load up with some gas if you can spare it."

"Rather," Cassidy said. "Be sure to drop in with Red on your way back. He's a great lad, Gleason."

A few minutes later the Gastineau Channel flashed under Sandy's wings and off to the right Mount Fairweather towered sixteen thousand feet into the cold, clear air.

"A lot he could tell me," Sandy said aloud and flipped his radio switch to



make contact with Bill. "Probably Bill will think I'm a dummy."

The deep growl of the Twin Wasp in the nose of his Eaglet became a thunderous roar as he opened his throttle and sped out over the Gulf of Alaska.

A few minutes later he had become definitely aware that there was something wrong with his radio. He tuned and checked and rechecked, but not even the rasp of static answered his efforts. He was debating what he had better do when he felt the Eaglet quiver like a mortally wounded animal. He could hear bullets drumming into its tail as a machine gun yammered above his head. For one startled instant he sat immobile, frozen to the stick.

Then he yanked it back into his stomach and zoomed up and over on his back as a black-and-red biplane streaked beneath him. At the top of his loop he half rolled the Eaglet to a level position and gazed over the side to see the rugged little biplane pull out of its dive and come around in a wide, sweeping bank.

"My golly," Sandy said to himself, "where did he come from?" His face was suddenly flushed and he could feel his blood racing through his body like white-hot fire. He opened his throttle wide and zoomed upward in an abrupt climbing turn until he almost stalled. Then he brought the nose down as the black-and-red biplane came streaking up underneath him with its twin guns spewing burst after burst of fire. Lead chewed through the leading edge of his left wing. He threw the Eaglet out of the line of fire as anger half choked him.

The pilot of the biplane had hung it on its prop to take it upstairs, then brought it around in a flashing chandelle. Sandy pulled his stick back and raced to meet the diving plane. His finger tightened on his gun trip and his guns chattered their song of death. His bullets drew a line along the engine housing of the fast biplane before the pilot skidded it out of range.

Sandy was talking to himself through clenched teeth. All fear had left him after that first surprise attack. He had settled down to handling the Eaglet like a veteran.

"You snake!" he shouted at the pilot of the black-and-red ship. "You low-down, sway-backed son of a pig! You'll try to shoot a man in the back, will you, you knife-throwing rat? I'll teach you, you——" He was working himself into a frightful rage when he remembered that that was one of the things Bill had taught him not to do.

The two ships streaked and tumbled across the sky, filling the air with the roar of their thundering motors and the chatter of their twin guns. They fired burst after burst at one another with-

out telling effect.

Sandy's fingers clamped down on his gun trip time after time as the biplane came under his sights. But before his bullets reached the other plane, it had slipped away. He made noises in his throat and almost lost control of himself again. Then his lips became a single hard, straight line across his face.

"Concentrate!" he told himself. "Study his tactics."

He slipped the Eaglet out of range as the black-and-red biplane came roaring at him again with its guns yammering fire and death. He kept right on by the rugged black-and-red ship, then yanked his stick up and threw it to the left as he kicked his rudder. He came up and over in a fast turn and dived again. But when he clamped down on his firing trip, the black-and-red plane disappeared from under his sights as though some unseen hand had flicked it out of danger.

Sandy shook his head in disgust. He realized that he was still bearing down too hard. He knew that he was doing the very thing Bill had taught him not to do. He was "freezing on his controls" like a novice. He was trying too hard.

"But, my gosh, he's a fighting fool!" he said aloud.

The next time the black-and-red ship flashed across his sights he kicked his rudder ever so little as his finger gripped hard on his trip. The nose of the Eaglet followed the course of the biplane for that split fraction of a second that is enough. His bullets wove a pattern from the engine housing to the tail assembly. The black riddled ship skidded off dangerously on one wing and yawed wildly. Sandy whipped the Eaglet around and went in for the kill. His breath was coming in short gasps now and his body was saturated with perspiration. He poured round after round at the other ship as the pilot tried to take it out of danger.

Sandy jammed the stick forward to follow the biplane in its frantic dive. Then he eased it back as the other ship came up and over in a dazzling Immelmann turn. Now he was above Sandy and diving on him with his guns flaming.

Only two thousand feet from the ground and diving at terrific speed, Sandy pushed the stick even farther forward to come up in an outside loop. He nearly blacked out as he hung, head downward, at the bottom of the loop. He opened his mouth and began to scream as the pressure became terrific.

Then he was up and climbing and his stomach felt as though it had climbed up into his throat. He gulped and probed the air for the black-and-red biplane. He knew where it was a second later when its bullets came drumming up through the belly of the

Eaglet. He barrel-rolled and the biplane zoomed past him.

Then he was under its belly, with his guns vomiting. He could see his tracers find their marks before it side-slipped out of range again.

Sandy's hands and arms were trembling now they were so tired. His body felt as though it had been racked with fever. He whipped around as he tried to draw air into his tortured lungs and find his enemy. His mouth dropped open, and he could not believe his eyes. He saw the black-and-red ship racing eastward at terrific speed. It had peeled off and was running away!

For a moment Sandy deliberated on whether or not he should follow him. The plane was headed back toward Juneau. Perhaps he would be forced to land there because of damage to his ship.

"He must have something to do with our being up here," Sandy said to himself. "But why did he attack me?"

He kicked the Eaglet halfway around and then changed his mind. He decided that Bill would want him to follow orders and make contact with him as fast as he could. He studied his chart for a moment, took his bearings and laid the nose of the Eaglet on the tip of the Alaska Peninsula.

Then he went back to the task of repairing his radio.

## VI—ONE MISSING

BILL BARNES probed the air ahead of him with anxious eyes as the afternoon wore on and no word came from Sandy. He made contact with Bev and Shorty time after time to learn if they had picked up any word from him. He thought that possibly his own radio receivers were out of order.

"How could you pick us up if there was anything wrong?" Shorty wanted to know, laughing. "You have the jitters, Bill. The kid is all right."

"Yeah," Bill said. "Probably he is. But it doesn't stay daylight forever. I'm worried about this whole layout. Shorty. Things have gone too smoothly. The only thing that has happened since that gal came to ask me to look for young Reynolds is the disappearance of Red. And he may be perfectly all right."

"He may be," Shorty said. "I don't want to make you worry any more, but I think we'll find out only too soon why we're here. It didn't just happen, Bill. This whole thing has a clever brain behind it. We want to keep our eyes open and our powder dry."

It was nearly dusk when Bill set the BT-4 down on the landlocked harbor of the little trading town of Unalaska, that last outpost of ships passing from the Pacific into the Bering Sea. The sun was down and the night was cold, as the Lancer and Bev's Snorter left



twin wakes on the still waters. Rain, driven by a stiff gale, began to pound on their overhead hatches as they put out their sea anchors to ride out the night.

Bill Barnes had become frantic with worry. He went over and over different possibilities as to what had happened to Sandy as he spread out his charts to study them.

McCoy and Neely blew up the rubber boat on the transport and paddled it over to the Lancer and Snorter to bring Shorty and Bev aboard the transport.

"We'll stay aboard," Bill said curtly to Shorty in answer to a question. "Charlie will throw together some supper. We've got to take turns standing watches at the radio. We'll go ashore in the morning and make inquiries about Red. I can't understand our not hearing from Sandy. He wouldn't have

"I hope that Sandy ain't down on the Gulf of Alaska on a night like this," old Charlie said to Bill. Shorty threw him a dirty look and Bev Bates kicked him in the ankle.

Bill didn't answer. He pushed his plate away from him as though the sight of food choked him and got to his feet. He went back on the bridge, threw the radio switch and began to chant Sandy's call letters for the thousandth time.

All through the night they took turns standing watches at the radio. And all through the night nothing came to them from the ether but the scratching roar of the storm and silence.

The rain had stopped when the first eager streaks of light crept out of the east. Bill Barnes was tossing back and forth on the cot in his cabin trying to get some sleep. Bev Bates was standing

plenty of lead. They flew me to a little island east of Rat Island. It has a small landlocked harbor like the one at Unalaska. They forced me to talk to Tony yesterday with a couple of guns on me. The only thing I could say, except what they told me to say, was that I'd had trouble with the nozzle injectors on my Diesels. Did you get that?"

"I got it," Bill said. "Who's holding you, Red? What's the layout?"

"I don't know, Bill," Red said. "I'm being guarded by a couple of gangsters that would rather shoot me than speak to me. Their names are Ugly and Lippy. I managed to slip down to my Snorter while they're asleep. They made me talk to Tony and told me what to say. They told me you were on the way to Unalaska. Is that where you are?"

"Yes," Bill said. "Haven't you learned anything from the two men who are guarding you?"

"Nothing," Red said. "They won't talk. This island is uninhabited except for them and some men living in a sort of barracks a quarter of a mile away. They're the same outfit. I think their boss is there. They won't tell me anything. Take down the position of this place, but don't bring the bomber over here. That's what they're after. I could tell that by their conversation. They call their boss Slip and they're afraid of him."

"Can't you take your Snorter out of there now?" Bill asked after he had written down the position Red gave him.

"My hands are tied and I think they've done something to the ship," Red said. "Remember those names—Ugly, Lippy, and Slip. They may mean something if I don't get out of here."

"You'll get out all right," Bill growled. "Sit tight, Red. I'll be there within two hours. Your Snorter is the only ship there?"

"That's right," Red said. His voice rose suddenly. "They're coming, Bill. I'm signing off!"

A new buzzing sounded in Bill's ear. He called Red's name a half dozen times but no voice answered him. He looked into Shorty's questioning eyes.

"Where is he?" Shorty asked.

"Some one is holding him a prisoner on an island west of here," Bill said.

"You got the position?" Shorty asked.

"Yes," Bill pointed to the piece of paper lying on the chart rack.

Shorty picked it up, checked it on the chart and started to go down the steps toward the port gangway.

"Where are you going?" Bill snapped at him.

"I'm going to get Red," Shorty snapped back. "Did he say how many of them there were? Does he know why they're holding him?"

"He doesn't know much more than



Grumman amphibian, two 400 h.p. Twin Wasp Jrs.

left Juneau if his radio had been out of order."

"You can't tell what that kid might do, Bill," Shorty said. "And don't forget it was right in this section that Red disappeared."

"I wish I could forget it," Bill said bitterly. "I wish I'd never heard of it. This whole thing is getting to be a hell of a mess and we don't even know what it's all about."

"Sandy may have had trouble with his motor and headed for Kodiak," Bev said.

"Yes and he may be down with his radio out of commission," Bill said. "I don't want to send out a distress signal yet."

"I might hop back over the Gulf and look for flares," Shorty said. "He would be on the course we took."

"Sit tight," Bill snapped. "I want the rest of you here, then I'll know where you are."

Old Charlie, the machine-gunner-cook, opened some cans of stew and concocted a huge salad from canned green vegetables. They ate it while the rain continued to beat down on the metal skin of the transport with increasing fury.

They could barely see the lights in the low, squat buildings along the waterfront through the sheets of water and the inky blackness of the night.

by the radio. He had just finished a short contact with Tony Lamport on Barnes Field and had thrown the radio key when the scarlet light on the panel brought him up in his chair again.

"BB—BB—BB—calling BB," came to his ears. "BBG—calling BB. BBG calling BB."

"Oh, Bill," Bev shouted, "Red is checking in!"

Bill's feet hit the deck with a thud. His powerful legs drove like pistons as he raced by the Eaglet's hangar and up the steps to the bridge.

"Gimme!" he said and spoke into the microphone.

"BB answering Red. BB answering BBG. Go ahead! Go ahead!" he shouted.

The voice that came back to his ears was barely a whisper. He could just hear it above the crackle of static.

"Can you speak louder, Red?" he asked. "Are you all right? Where are you?"

"O. K., Bill," Red said. "I've got to talk fast and I don't dare talk too loud or they'll hear me. I'm a prisoner, Bill. I was forced down four or five days ago by a half dozen red-and-black, single-seater Barton Hawks. They all mounted two machine guns. I couldn't get away from them. They knew how to use their guns. I had to land or take



we do," Bill said. "Two men are guarding him. But there are more there. He doesn't know how many. He says they're after the BT-4, but doesn't know why. You wait a minute, Shorty. Let me think this thing over. We haven't had any word from Sandy yet. Red said this gang have a half dozen Barton Hawks, all armed with two machine guns each. They may have spotted Sandy, too—picking us up one at a time so they can get the bomber. We're playing right into their hands."

"Sitting here won't help Red," Shorty said, and moved toward the steps again.

"Wait a minute!" Bill snapped. "I'll go after Red in the Lancer. I'll have more guns and more speed in case I run into trouble. You take the Snorter and double back over the course we

tion Red had given him and checked it on his chart.

"Nearly two hours," he said to himself and he began to think about the strange series of events that had happened in the past few days.

"It's almost a certainty," he said to himself, "that the disappearance of young Reynolds has nothing to do with the thing. Unless—unless—" And there he stopped.

The Island of the Four Mountains towered up ahead, looking like one vast cathedral with four uneven spires rising from its center. The sun was climbing into the heavens now, behind him, and the air was clear and cold. He knew that he should be able to throw off the feeling of anxiety that nagged at him. But he couldn't. Not even the brilliance of the day and the crisp, clean

Lancer upward and went into a conference with himself. He wished he had brought the bomber and the rest of his men with him.

He thought of dropping two or three of the twenty-five-pound bombs that nestled in the belly of the Lancer, going in for a landing and trusting to luck that he and Red could fight their way out again. But he knew that might be suicide.

Suddenly he forgot all those things and his eyes flew open as he set up in his bucket seat and probed the air all around him. The roar of four or five airplane motors had joined the drone of his Diesels!

Yet he could see no planes. He looked back and up on both sides of him and thumbed the sun. Were his ears playing tricks on him? Was it a strange air current that made the Diesels in the nose of the Lancer a sound illusion? He bent his head and cocked it to the right, then to the left. It sounded one moment as though the planes were above him—the next, as though they were below. And it was increasing in volume as though the planes were screaming into a power dive or pouring in juice for a take-off.

He swung around in a wide, sweeping circle that would take him completely around the tiny island.

And while he was turning it happened!

Five red-and-black amphibians came roaring out of a rock-sheltered harbor, so close together that their wailing props nearly touched the trimming tabs of one another's rudders. Then they broke and went hurtling over the water and into the air in five different directions. They were spread out like the five fingers on an outstretched hand as they raced into the air. Their pilots hung them on their props and took them upstairs with the dazzling speed of the fastest interceptor.

Then they converged and formed an echelon that came tearing back like five steps—with their twin guns vomiting lead and death at the Lancer.

Bill had been watching them like a man in a trance, so complete was his surprise. For a few moments he hadn't been able to believe what he saw. Then he realized that the floor of the hidden airdrome was the surface of the harbor. It was a perfect camouflage. His astonishment was so great that he watched them whip into the air and get above him before he thought of his own safety.

He stuck the nose of the Lancer down and slipped it out of range of their guns while he deliberated on what to do. He knew that he could open the Lancer up and walk away from them. But that wouldn't help Red.

He heard the bark of a light gun below him, felt the Lancer bounce and



One of Slip Ogden's amphibian fighters.

held yesterday. See if you can pick up some word from Sandy. When you get part way back, you ought to be able to pick up Juneau and Fairbanks on your radio. Bev will have to stay here with the crew of the bomber.

"This damned thing doesn't make any sense," he said. "I don't want you to go all the way back across the Gulf. Use your own judgment. I'll try to get Red out of there. If I'm not back by the time you are, you had better come and take a look. Give me that latitude and longitude; you copy it."

"O. K.," Shorty said. "Let's go!"

## VII—TRAP

WHEN Bill Barnes took the Lancer off the waters of the harbor a half hour later, his thoughts were as gray as the drab, colorless morning. He had a feeling of impending tragedy that he could not throw off. He hung the Lancer on its props and took it up to ten thousand feet. He thought that once he was in the air he could dispel the gnawing fear that seemed to have crept into his very bones. He opened the throttles of the Lancer wide and watched his air-speed indicator climb from three hundred to four hundred miles an hour. When it had reached four hundred and fifty, he closed his throttles a notch and there he held her. He studied the posi-

air he sucked into his lungs seemed to help.

Suppose, he thought, after all the things I have been through in the past few years, this is the end. That I end my life in the cold, drab waters of the Bering Sea. Suppose—

"Hey!" he shouted at himself. "Snap out of it, Barnes, or you'll begin to cry."

As the last of the innumerable Andreanof Islands sped beneath his wings, he cut his throttles, flipped the tail of the Lancer up and checked his position.

A single tiny island loomed off to starboard—just a rocky dot that marked the spot where the Bering Sea and Pacific mingled. He probed the air all around him as he nosed the Lancer down in wide, sweeping spirals. He estimated that the little island was about five miles long and not more than two wide. It was as barren and desolate a place as he had ever seen.

Then he saw Red's Snorter—left high and dry on the beach of the landlocked harbor by the receding tide. He saw a half dozen crudely constructed buildings and a pair of powerful radio masts. He circled low above the little island, but could see no sign of life. He supposed that they were keeping out of sight—hoping to lure him lower, within range of machine guns. He zoomed the



saw streaks of white and yellow smoke off to his left. He shifted his course as the antiaircraft gun below spoke again and missed.

White streamers of tracers floated through the air as the five red-and-black biplanes thundered down on him. He stuck the stick of the Lancer forward again as bullets laced just above his head. Then he came up and over in a flashing Immelmann to throw the ships off his tail.

Bill's mouth became grim as he leveled off and fired two quick bursts to test his guns. Opening his throttle, he stuck the nose of the Lancer up in an abrupt climbing turn until it almost stalled. There he kicked his rudder and rolled to the right.

He could feel bullets slashing through his tail and hear the *tat-tat-tat* of machine guns as the biplanes came up under him. He sent the Lancer skyward in a desperate zoom and then chandelled back to the attack.

The Lancer, with its terrific speed and maneuverability, was up and over and diving head-on at the five biplanes as though it had gone berserk. They dove and zoomed, skidded and rolled to get out of its flaming path. Bill's finger was fastened down hard on his gun trip. He raked one of the red-and-black ships with a withering fire, but the pilot slipped it out of range before his bullets struck a vulnerable spot.

He gunned his engine again and came over in a normal loop to roll right side up at the top. The five ships had spread out now and were trying to form a circle around him so that they could get him in the vortex of their fire. He wished, as he had never wished before, that Sandy was in the tail to help break their circle with the swivel gun.

Then the air seemed choked with slashing streaks of red and black as they circled on their prey. They were everywhere, charging in from all angles, their guns screaming lead.

Bill tried to break through that circle without having to run a death-dealing gantlet of lead. He realized that these five pilots knew all of the old and all of the new tricks of combat flying. They were a bunch of veterans who never made a mistake. Their tactics were flawless as they converged on him. He felt as though he was hemmed in by a band of steel from which there was no escape.

When those five ships formed an echelon and dove on him, he had taken it in his stride. It had seemed similar to a hundred other attacks. But now he knew it was different. These men were all masters at their craft. He could picture their lined, hard-bitten faces behind their windshields. He knew that they were men like Red and

Shorty, veterans of a thousand battles in the air.

He whipped the Lancer up and down, skidded and sideslipped, zoomed and crabbed to avoid the streams of death that were aimed at him. He knew that if he could cut out of that circle without being annihilated he could run away from them. But he couldn't cut out without putting himself in a position where they could chop his head from his shoulders with their bullets. They knew how to anticipate every move he made.

And he was getting tired, desperately tired. He opened the throttles of the Lancer even wider, taking a chance on "blacking out" to increase the speed of his maneuvers. But still they clung to him like blood-sucking leeches. Each one did his part as though he had rehearsed it a million times.

For the first time in his life Bill Barnes knew stark terror in the air. It wasn't that he was afraid of the death they were trying to mete out to him. It was something else that he couldn't understand himself. It was as though he was inclosed in an air-tight chamber from which there was no escaping—where he must surely and slowly strangle to death.

Cold, damp perspiration oozed out all over his throbbing body. He thought, "This is the end. The premonition I had this morning is coming true."

They were closing in on him now. He braced himself like a man who is about to take a blow in the face. Opening his throttles wide, he yanked the control column back into his stomach as he decided to go through or die trying. As he came up and over on his back and started to roll right side up, black despair seized him.

The Lancer skidded off to the right and the nose dropped. As it spun once, then twice, he warped and managed to bring the nose up. He was aware that the red-and-black ships were holding their fire as he started a glide toward the waters below. They fell in on each side and above and below him. The pilot on the port side leaned over the cowl and motioned downward with one hand. They knew he was helpless, that he could no longer maneuver for combat.

For one black moment rage surged through him. They had got him the way they got Red. And, probably, the way they had got Sandy.

He flipped over his radio switch and began to chant his own call letters into the microphone. "BB calling all ships," he said. "BB calling all ships!"

But no voice answered him. Once the scratching increased in his ear and he thought he heard a voice. He shouted into his mike, but the voice faded away and there was only silence.

Spume and spray that was like ice

shot high in the air as he sat the Lancer down on the waters of the Bering Sea. The five red-and-black amphibians landed beside him. He slipped an automatic out of a pocket and stuck it in his overall as they taxied toward him.

They made motions for him to kill his engines and he obeyed. The five pilots had pushed their goggles back on their foreheads and were laughing at him when he climbed out to catch the line one of them threw him.

"Bill Barnes, the boy wonder, eh?" one of them shouted at him. "Throw that gat you have in your pocket over the side!"

Bill remained silent as he watched his automatic disappear beneath the water. As the line tightened, he manipulated his steerable water rudder to follow the course of the red-and-black ship in front of him. The other four ships taxied along beside him as they headed toward the little harbor.



Slip Ogden.

The five hard-faced pilots weren't laughing as they ordered Bill out of the cockpit of the Lancer into a boat one of them rowed. They didn't even speak to him. But he could tell by the glitter in their eyes that any one of them would have been glad to cut his throat.

Two men, who were even harder-looking than the five pilots, took charge of Bill when he stepped out on the dock.

"Git up there with your pal, punk," one of them said to Bill.

Bill didn't even look at him. He started toward the crude little hut a hundred feet from the waterfront and saw Red Gleason standing in the doorway. He was so tired he could hardly walk.

#### VIII—THE PLAN

"THEY got you, too, did they?" Red said. "I didn't think you'd try to come alone."

His face was cut and battered. Both his eyes were half closed and tinged with yellow, blue, and black. But his carrot-colored hair flamed as brightly as ever.

"I slammed one of those plug-uglies



on the nose," Red went on in answer to the question in Bill's eyes. "They tied my hands behind my back and went to work on me."

"Who are they?" Bill asked as he slumped onto a bench and put his head in his hands. "I'm tired. They wore me down and shot my controls in half."

"They're fighting so-and-sos," Red said. "They did the same thing to me. Whoever is running this show is smart. Things have been clicking perfectly for them. They forced me down, then forced me to fly my ship in here. They let me know that you would be at Unalaska, then gave me a chance to slip away and make contact with you. They knew you'd come to get me and then they could get you."

Bill lifted his head as the motors of the five red-and-black ships roared. He watched their pilots whip them into the air with admiration in his eyes.

"They're going after the BT-4 now," Red said.

"Why do they want it?" Bill asked.

"I don't know," Red said. "I never found any information about young Reynolds. That story was a stall to get us up here."

"I know that now," Bill said. "But what's behind the whole thing? If they wanted my bomber why didn't they steal it down on Long Island without all these elaborate plans? Why—"

A shadow loomed in the doorway and the man who stood there said, "Maybe I can help you out with that one." He laughed. "I'm glad you arrived this morning, Barnes. It is going to make things a lot easier for me."

"The pleasure," Bill said with no little trepidation as he gazed into the eyes of Slip Ogden, "is entirely yours." He knew without asking that this was the enemy he had been fighting in the dark. He knew that only such a man would be capable of the cold, ruthless efficiency with which he had been lured to the Aleutian Islands.

"I imagine it is," Slip Ogden said. "You're younger than I thought you would be—young to have such a reputation."

Bill didn't answer him. He would have liked to have answered him by crashing his fist into his cool, insolent face.

"I wanted you up here with your bomber, Barnes," Slip went on. "That's why I didn't get it on Long Island. You'd probably like to hear all about it." He sat down. "But let me warn you first not to try to get rough. Two of my men are outside—Ugly Barillo and Lippy Freeman. You may have heard of them. They have quite a reputation, also. Not quite so savory as yours, but a reputation. Your friend here will testify that they are very handy with their fists."

"Nuts!" Red said. "If you have anything to tell us, tell it!"

"In my own good time, my friend," Ogden said and his cold eyes bored into Red. "It might relieve your mind to know, Barnes," he said, turning back to Bill, "that your young friend Sanders is safe. From the report I have he is a better combat pilot than you are. And that report comes from no less a person than Claw Lawson."

"Claw Lawson!" Bill said. The image of an evil-faced man with a hook for a left hand flashed through his mind. He knew "Claw" Lawson as founder and leader of a nefarious squadron of fliers who would undertake anything criminal if it promised to pay enough money. "What has Claw Lawson to do with Sanders?"

"Claw was out scouting your ships when they got up this way," Ogden said. "He ran into young Sanders alone over the Gulf and thought he would make you one less. But Sanders out-fought him and forced him to peel off to get patched up. Sanders started to follow you, but had to turn back. He landed at Flat."

"Thanks," Bill said, and he meant it.

"But about your bomber, Barnes," Ogden said. "You probably know that I was forced to get out of New York a few months ago. The way things turned out I had to stay out. So I had to find a new way to live."

"An item in a New York newspaper caught my eye and attracted my fancy. It told about all the gold that is being moved from the Orient to San Francisco these days. It mentioned that they did not let the authorities in San Francisco know of the day of arrival until a day or two before the ships arrived. It was thought that was because of all the war trouble in the Orient. It suggested an idea to me. It suggested that one of those ships could be robbed at sea, from the air. I used to be something of a flier myself, Barnes."

He waited a moment, hoping Bill would ask him about his flying. But Bill did not open his lips.

"I got in touch with Claw Lawson and he said he thought it could be done," Ogden went on. "But if we put men on one of the boats coming from the Orient to subdue the crew, what would we do with the gold after we had it? If we transferred it to a yacht or a tramp we might buy. United States destroyers would catch up to us. I thought about your bomber. I know a great deal about that bomber now, Barnes. I know it will carry nearly six million dollars in gold bullion. That is just about what these shipments come to."

"We figured we could take the gold off the boat from the Orient, load it on your bomber and then load it on a yacht a couple of thousand miles away,

where no one would possibly look for us."

"Why did you want Red Gleason up here?" Bill asked.

"I didn't," Ogden said. "We tried to think of a way to get you up here with your bomber. We planted a girl on Miss Reynolds as her secretary. We knew, impersonating Miss Reynolds, she could give you a plausible reason for coming up here with your men and your bomber. But you didn't fall for it. You sent Gleason. So we had to get him so you'd follow to rescue him."

"You see, Barnes, we had figured on your reputation for sticking your nose in other people's business. It worked; you came. There will be a steamer along on the Yokohama-San Francisco lane to-morrow. She is carrying a little under six million in gold. After we figure nearly a million for our expenses, we will have about five million left. That will keep us for a couple of years and we won't be bothered by having G-men chasing us all over the world."

"Why won't they chase you?" Red Gleason wanted to know.

"Why?" Ogden laughed. "Because they'll think Barnes and his men committed the little act of piracy. You're known to be up in this section. But no one knows why. After we've loaded the gold aboard a yacht that is waiting a couple of thousand miles from here, your bomber and your men will be brought back near the scene of the holdup, Barnes. Destroyers will find your men adrift in the bomber without supplies, fuel, or radio. The bomber will be identified as the plane that carried away the gold. And your men will be in it, dead."

"It won't work," Bill said. "What about the gold?"

"There will be a little of it left in the bomber," Ogden said. "Just enough to make it incriminating. They won't know what happened to the rest of it. They will think your men threw it overboard when they found themselves in danger of sinking. A very neat little scheme, eh? Right from the beginning it has worked like a charm."

"What about me?" Bill asked. "If they don't find me in the bomber, they'll think I've double-crossed my men and got the gold away in some manner."

"You?" Ogden said thoughtfully. "Oh, yes. I didn't tell you that you will be found dead in your Silver Lancer. That will puzzle 'em still more, eh, Barnes?"

"Yes," Bill said, "that ought to drive 'em crazy!"

He reached forward and grabbed at the lapels of Ogden's jacket with his left hand and lifted him until his toes barely touched the ground. As Ogden started to squawk out a name, Bill's right fist caught him full on the mouth.



The blow lifted Ogden through the doorway and out on the rocky ground.

Lippy Freeman had a gun in his hand as he came through the door. But he didn't use it. He pointed it at Bill's stomach while curses surged from his lips and he gave Ugly Barillo instructions.

Bill didn't even look toward Ugly as Ugly crashed a leather-covered blackjack on the side of Bill's head. His knees folded and he crumpled in an inert mass. An instant later Red crashed down beside him.

## IX—RELEASE

WHEN Bill opened his eyes, the walls of the dark little hut danced back and forth. He fought an almost overwhelming nausea for a few minutes and opened his eyes again. He tried to struggle up from the bunk on which he was lying and found that his wrists and ankles and body were securely tied to it. A vision of Slip Ogden's sneering face floated before him and he cursed aloud.

"Are you all right, Bill?" Red's voice said from the darkness across the hut. "Yeah," Bill said savagely. "I'm fine! I'd like to—"

"Forget it," Red said. "We've got to figure a way out of here. You've been out for hours. The BT-4 is riding on the harbor with those six biplanes of Ogden's. I heard her come in. They got her. I'm sorry to have to greet you with that. I found out from the plug-ugly who slapped you on the head that they got her by some ruse without injuring Bev or any of the crew. They dropped 'em off on an uninhabited island between Andreanof and the Island of the Four Mountains until they are ready to go back and turn 'em adrift aboard the bomber."

"What about Shorty and Sandy?" Bill asked.

"I couldn't find out anything about them," Red said. "You better take it easy and try to rest. You took an awful clip on the head."

"I don't know what the hell else I can do," Bill said. "No one has ever made such a sucker of me before. I've been leading with my head ever since this thing started. I deserve to get it clipped. Are you tied to your bunk?" "Yes," Red said. "But I think they'll untie us before they leave."

"Leave?" Bill said sharply.

"They're getting ready to meet that gold carrier from the Orient in the morning," Red said. "They'll pick her up about four hundred miles south of here."

"A nicely planned job," Bill said softly. "They have men aboard to seize her and stop her engines when they come in sight. They'll take the gold off, load it aboard the bomber and fly it down near Midway Island to

stow it aboard their yacht. The yacht will carry fuel for the bomber. After they've taken off the gold, they'll head for the South Sea Islands and disappear and my bomber and the Lancer will be found on the scene of the crime. Very neat, very neat."

"We've got to stop 'em somehow, Bill," Red said.

"Yes, we've got to stop 'em if we don't want to die. But how?"

Throughout the rest of the day they could hear the twin Diesels in the BT-4 being tested and retested. They heard the motors in the noses of the little red-and-black fighters roar to life and subside—heard the voices of their pilots as they worked over them.

Long shadows fell across the doorway and then night settled down on the lonely little island before any one came near them. Slip Ogden and Lippy Freeman and Ugly Barillo came back to their prison to gloat.

Freeman and Barillo put trays of food on the floor and unfastened their bonds. Bill's eyes locked with Slip Ogden's for a moment and held. Then he shrugged his shoulders and tried to eat the food before him.

"I thought you were a lot smarter than you are, Barnes," Ogden said. "Any one of a hundred things might have spoiled my little scheme. But you stuck your head right in the noose and pulled it tight. Without your kind co-operation I might have failed. Now that gold is practically in my pocket. Because of your help I'm not going to pay you for that punch in the mouth last night. I'll let the boys pay you when they come back to put you in your Lancer. You're going to enjoy that."

"Get out of here!" Red Gleason stormed at him.

"Close your trap, punk," Lippy Freeman snarled.

"Let him talk. Let him talk," Ogden said. "I like his spirit. At least he has enough guts to talk back."

For fifteen minutes he tried to goad Bill into making some move for which he could retaliate. But Bill refused to even answer him. He kept his eyes on his food and would not be baited.

When they had finished eating, they were tied up again.

Slip wished them a mocking good night.

Throughout that long, horrible night Bill Barnes tossed and turned as much as the ropes that tied him would permit, cursed himself and his throbbing head. Both he and Red tried to free themselves, but their efforts only added to the tightness of their bonds.

"They have some kind of slip nooses on us," Red gasped. "The more we struggle the tighter they get."

"As Ogden said," Bill grated, "we stuck our head in the noose and pulled

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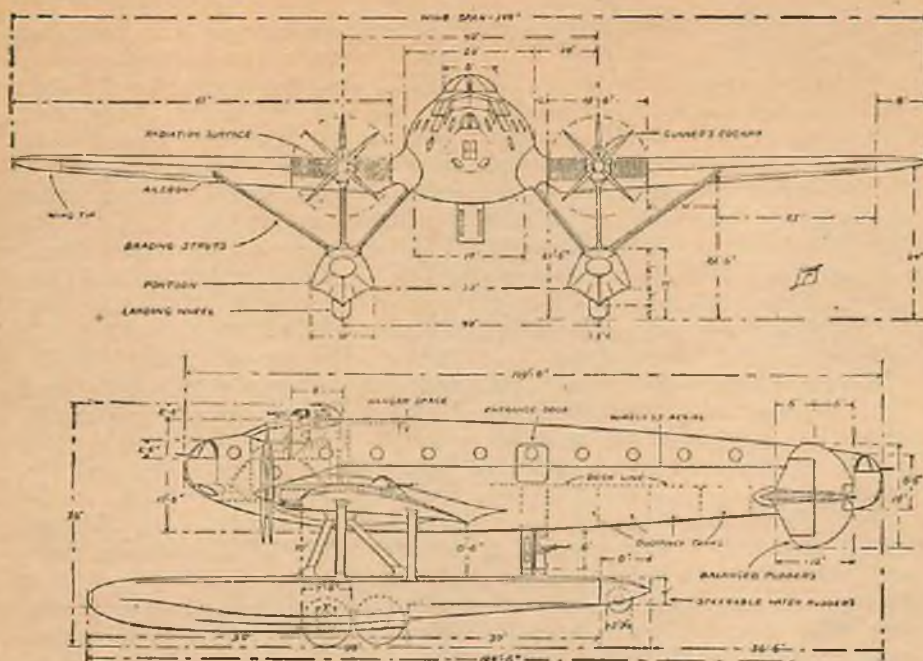
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1/16x1/4 35 for 5c	WHEELS per pr.	PAUL-O-WINA	5" 10c. Add 5c per
1/16x3/16 18, 5c	Brch Balsa Colu	5" 10c. Add 5c per	in. up to 10 in.
1/16x1/2 15 for 5c	1/2 .01 .03	Machine Props.	5 in. . . . . 4c
1/16x3/4 5 for 5c	1/2 .02 .01 .05	(Add 1c per in.	up to 16 in.)
3/32x3/32 30, 5c	1 .03 .05 .07	THRUST	
3/32x1/2 30 for 5c	1 1/2 .01 .05 .10	BEARINGS 1c	
3/32x3/4 12 for 5c	1 1/2 .02 .05 .10	BUSHINGS	3c
3/32x1 10 for 5c	3 .15 .30	ALUMINUM	
3/16x3/16 8, 5c	18" Balsa Planks	WHEELS	
3/16x1/2 0 for 5c	1x1 .1 for 4c	1" pr. . . . . 6c	
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3/16x1 2 for 5c	2x2 .1 for 15c	1 1/2" pr. . . . . 14c	
18" Balsa Sheets	2x3 .1 for 25c	NOSE PLUGS	
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as Sandy stepped out of the water brought him to a complete stop. He crouched forward with the automatic out in front of him while he stared toward the hut a hundred feet back from the beach.

"Hey! Sandy!" came Red Gleason's bull roar again.

Sandy ran, still half crouched with the automatic out in front of him, toward the shack. He knew he had heard Red's voice, but he didn't know what he was walking into. The sound of Bill's voice quickened his step. He went in the door cautiously, half expecting to be greeted with a fusillade of shots. Instead Red Gleason's roar greeted him.

"Quick, kid!" he said. "Get a knife and cut these ropes."

Sandy turned and raced back toward the Snorter without a word. He cupped his hands and shouted at Shorty that he had found Bill and Red and told him to bring a knife to cut them loose.

A few minutes later they were staring at the badly dressed cut on the side of Bill's head and at Red's battered face. They saw that Bill's face was white and drawn underneath its tan.

"What about those two mugs who were guarding us?" he asked weakly.

"I think they're dead," Shorty said.

"Make sure!" Bill snapped at Sandy. He suddenly realized that with the exception of Bev Bates, and he knew where to find him, all of his men were with him again. He seemed to take a new lease on life as color flowed back into his face.

"What about the Lancer?" he asked Shorty. "Is it ready to go?"

"I'll check it," Shorty said. "Go where?"

Before he answered him he said to Red, "Is your Snorter O. K.?"

"I'll find out," Red said, and he

started for the rowboat tied up at the dock.

"You've heard about Slip Ogden?" Bill said to Shorty.

"Plenty," Shorty said.

"He's running this show," Bill said. "He has our bomber and is boarding a gold-carrying steamer on the Yokohama-San Francisco lane four hundred miles south of here. We've got to stop him. He has Claw Lawson and his cutthroat outfit with him. That's the set-up. Where did you find Sandy?"

"At Flat," Shorty said. "His radio went bad and he was afraid to try getting to Unalaska without it. After I got him I couldn't make contact with any one. He left the Eaglet at Flat to have one of his tanks repaired. We shoved for Unalaska and the bomber was gone. Some natives told us about the half dozen red-and-black fighters, like the one that attacked Sandy. We combed the islands as far as the Andreanof group and spotted Bev and the crew of the bomber. I—"

"They're all right?" Bill broke in.

"They're O. K.," Shorty said. "Bev told me—"

"We haven't time to talk now," Bill snapped. "We've got to get there before Ogden gets that gold aboard the bomber. I'm going up to his quarters to see if he left a chart that will tell me where he is going to intercept the steamer. Get Sandy in your Snorter. We've got to go!"

He started running toward the building where Slip Ogden and his men had been quartered. The room was a wreck, as though some one had made a hasty job of packing by throwing the things they didn't want on the floor.

That was where he found the chart that told him where he would find Ogden and his men. The spot was

marked with a tiny cross and was almost due south.

The twin Diesels in the nose of Bill's Lancer were blasting when he reached the little dock. Red taxied it around close to the shore and Bill waded out to climb into the front cockpit.

"She's all right?" he shouted above the roar of the engines.

Red nodded his head and Bill blasted the tail around and waved a hand at Shorty. He took the big ship down the harbor and lifted it into the air with his old reckless abandon. He flipped his radio key and spoke to Shorty on the radiophone.

"Give her all she's got," he said. "We have about an hour's run. If those six red-and-black fighters try to intercept us, you'll have to keep them busy while I go on to disable the bomber."

"Let her ride!" Shorty said.

## X—RETRIBUTION

THE *Bitsi Maru* plowed steadily westward as the captain and his force of deck officers assembled on the bridge to take their eight-o'clock sight.

"Eight bells," the captain called.

"Make it so," the first officer said as the quartermaster struck the eight bells.

As the officers finished working up their positions and handed them to the master, the deep-throated drone of a twin-motored plane joined the throbbing of the ship's turbines. Startled, they shaded their eyes from the glare of the sun and gazed upward.

The first officer's eyes widened as he studied the shining monster. His interest in airplanes was second only to his interest in ships. He hurried into the chart room, came back with a powerful pair of binoculars, and turned them on the ship overhead.

"She's powerful and she's fast, sir," he said. "And she's armed to the teeth. Five machine gunners' cockpits and a one-pounder besides her bombs."

"What is she doing up here?" the captain wanted to know.

"She—"

"Get your hands in the air and keep 'em there!" a voice behind them said. The voice was as hard as the sound of steel on steel. The captain thought about the cargo of gold they were carrying in their strong room as he raised his hands.

A half dozen shouts sounded from the decks below, followed by the jangle of the telegraph in the engine room. The steady, rhythmic hum of the turbines stopped as six red-and-black biplanes roared out of the sun overhead and swept the decks of the ship with machine-gun bullets.

The big bomber circled back into the wind to glide downward as the *Bitsi Maru* came under the complete domina-



tion of the half dozen pirates aboard her.

Five minutes later Slip Ogden directed the lashing of the bomber alongside a cargo port that was opened. There was a dull explosion inside the ship and men began carrying little iron boxes from the strong room to the open cargo port and across the port wing of the big amphibian. A flat-nosed man with a voice like an angry bull sat on the saddle of a portable machine gun above the port. He roared occasional orders at the white-faced passengers lined up along the rail.

The six red-and-black fighters had settled down on the waters of the Pacific with their idling props and machine guns pointed at the steamer's sides.

Slip Ogden laughed softly as a man reported to him that no radio message had gone out from the *Bitsi Maru* and the wireless room had been demolished.

"We'll be away from here in forty-five minutes," he said. "Make a check on all our men and be sure they are all ready to go when we're loaded."

"Yes, sir," the man said, and went back aboard the steamer.

The BT-4 was sagging low in the water as the last of the gold was stowed into her bomb bay. The six red-and-black fighters were circling low overhead, ready to form a protective screen around the bomber when she left the water.

Four miles above the surface of the Pacific, Bill Barnes put a pair of binoculars against his eyes and studied the six circling specks, the bomber and the steamer.

"All right, Shorty," he said into his microphone. His voice was calm. "Stick your nose down. Get one of 'em on your first dive. Watch out for the one-pounder on the BT-4. Don't give him a chance to get you under his sights. Let her go!"

Bill jammed the control stick forward and opened his throttle. The twin props of the Lancer whined in protest as a gale screamed and shrieked through the bracing struts. Down and down the two ships sped until it seemed they must fly into a million flaming pieces and dissolve into thin air.

Bill's mouth was a twisted slash across his face as he instinctively listened to the high-pitched whine of the motor and tested the vibration with his own body. His knuckles showed white, so tightly were his fingers wrapped around the control stick—easing it backward ever so little to see how the ship responded, then slamming it forward again.

At ten thousand feet, as his Snorter reached terminal velocity, Shorty coaxed the stick back with the touch of a master, until the nose began to rise. Then

he jammed it down again, racing neck and neck with Bill.

Slip Ogden's eyes became round with horror as the eerie scream of those four diving props permeated his consciousness and caused him to look overhead. For one instant the expression of cold ruthlessness was wiped from his face as those two harbingers of death roared down on him. Then he saw that his six red-and-black fighters were aware of the diving ships and were maneuvering to escape that first vicious attack.

"Have you picked your man?" Bill Barnes screamed into his microphone at almost the same instant the smug expression of confidence came back to Ogden's face.

"Yes!" Shorty roared back.

They eased out of their power dive and shallow dived to make their guns effective. As one of the red-and-black ships whipped around in a fast Immelmann, Shorty pulled his Snorter up into a loop. At the top he centered his controls. The weight of his body sagged on his safety strap as he hung head downward and lined up the biplane in his sights. His guns belched streams of death as his finger clamped down on his trip. The pilot of the red-and-black fighter tried to skid away. Then his nose dropped and the ship began to weave downward, half out of control. Shorty rolled his Snorter right side up and poured burst after burst into it as it started its last plunge and whirled into a spin.

The pilot of the ship Bill had singled out tried to escape in a fast climbing turn as Bill fired his first tracer. He eased his stick over and tapped his rudder as his guns began their song of death. His bullets wove a pattern from the hub to the tail structure. The biplane slipped off on one wing and yawed wildly as Bill pulled out and whipped the Lancer upward. He poured round after round into the whirling ship as it plunged to its death. There was no pity or mercy in his heart as the plane struck the water, shooting a geyser high into the air.

As he straightened out, he heard Red's swivel gun chattering behind him. He scanned the air for Shorty and found him two thousand feet overhead, maneuvering to keep out of range of the one-and-a-half-inch shells from the bomber.

The four surviving red-and-black fighters had leveled off three thousand feet above Shorty and were preparing to attack. Bill watched the flippers of one of them as he instructed the others. He knew that before they tried to survive that attack he must silence the one-pounder in the circular turret in the top of the BT-4.

He cursed Slip Ogden again as he stuck the nose of his Lancer down. He knew that Ogden, the only man that

had ever made a complete sucker of him, was some place aboard the bomber. And he knew that he must half wreck his own ship to prevent Ogden from taking it off the water. He could see men casting the lines away as he nosed down with his finger curled around his gun trips.

His tracers wove their pattern above the BT-4 and he eased his stick forward a little more. Machine-gun bullets pounded up through the wings and fuselage of his Lancer. But he held his guns straight on the tail—wide open. He saw the man in the after gun cockpit crumple up and collapse. Then his bullets tore into the bridge and the revolving gun turret above it. He saw Slip Ogden crumple over the one-pounder and he felt a tremendous surge of exultation.

He knew now that nothing could stop him as those four red-and-black fighters pounced on him from above. For a moment he took a terrific concentration of their fire. Then he hung his Lancer on its props and took it upstairs.

He saw Shorty slash across the rear of one of the diving ships and pump his bullets into the pilot. He saw the pilot jerk upward out of his seat and then fall back as his ship zoomed straight up and over on its back.

Then he was back in the fight with the fierce joy of fighting an enemy who should be destroyed. He saw the terror-stricken faces of the passengers of the *Bitsi Maru* as he brought the Lancer around on one wing tip and poured bullets into a red-and-black fighter that was going away. But he wasn't going away fast enough. Bill's stream of lead literally tore the pilot's head from his shoulders and the ship plummeted toward the sea.

There were only two of the biplanes left now. But they did not peel off and run as Bill had expected them to. They came storming in on Shorty to get him in a cross fire.

Shorty rolled his Snorter out of range as Bill got the first one under the sights of his cannon. He fired a burst of five explosive shells that detonated on the red-and-black fighter's engine housing. The ship became a ball of black smoke, streaked with orange flame, as it plunged out of the fight.

At the same instant Shorty came up underneath the sixth and last one to pour death into its vitals. The nose dropped and it joined its brothers in the Pacific as the passengers and crew of the *Bitsi Maru* screamed their joy to the heavens.

BILL BARNES, Red Gleason, Shorty Hassfurth and the irrepressible Sandy sat in the captain's suite of the *Bitsi Maru* an hour later. They had checked the bomber and found that they could fly it back to Alaska for repairs.



"That," the captain of the *Bitsi Maru* said, flashing his white, even teeth, "was a most beautiful bit of flying."

"It had to be," Bill said. "But what does it get me? Both my ships and my men are wrecks. They're scattered all over the Aleutian Islands and Alaska. It will cost me a small fortune to fix up the BT-4, the Lancer, and Sandy's Eaglet—to say nothing of my head."

"Your head didn't hurt as much as your ego, Bill," the grinning Sandy said. "You were afraid you were going to be taken for a sucker."

"Well," Bill snapped, "wasn't I?"

"Until the end—when it counted," the captain said. "My owners will be only too glad to more than recompense you for your time and the damage to your planes."

"That," Bill said, "will help. But don't think we came out on the long end because of my efforts." His eyes swept the faces of his men with an

expression of pride. "I would have been a prime sucker if my men hadn't been behind me every minute. Shorty and Sandy pulled the fat out of the fire." He got to his feet and his eyes were shining. "Now we can get back to our work and forget this thing."

"Say, Bill," Sandy said, his freckled face spotted with grime and smoke from his machine gun. "I haven't had a chance to tell you I've got to lay over a few days in Alaska. I got something to do up there."

"You've what?" Bill said, looking at him suspiciously.

"I met a couple of Eskimos at Flat," Sandy said. "They're going to take me up in the northeast, shooting."

"Shooting what?" Bill growled.

"Reindeers from the air," Sandy said.

"You better look out or your pal, Santa Claus, will give you hell!" Shorty Haffsurther said—when he could stop laughing.

## PARIS DEFENDER

(Continued from page 52)

plate 2. The rear spring brackets only are cemented to the fuselage. The pants should be carved from soft blocks, doped and sanded, then hollowed out to allow the wheels to turn freely. Note that the diagonal wire braces also act as axles.

### NOSE AND PROPELLERS

The scale propeller design is an oddly shaped metal type to turn clockwise. The flying propeller is of ample size to turn in excellent flights. Blank and carve it carefully, then dope and sand until glossy. Balance may be obtained by adding more dope to the light end.

Note that the nose block is made in three pieces. The  $\frac{1}{8}$ " sheet is first cut out and the radiator grill effect pressed in, then the front portions are added. Cement the assembled block to former A and finish sanding to conform with the fuselage lines. The shape of the nose plug is clearly indicated, and should be a removable snug fit. Cement a  $\frac{1}{16}$ " aluminum tube bearing in and then attach the propeller in the usual manner. A winding loop bent in the propeller shaft will be beneficial if a winder is to be used.

### COMPLETING THE MODEL

Cement soft blocks to the lower wing fillets and sand them to conform with the first rib. Attach the top wing with a template block cut to conform with the space between the top of the fuselage and the center top wing rib. Cement the center struts firmly to the fuselage and wing ribs. Pin the lower wing ribs to the fillets and cut the "I" struts to between the wing frames properly. The horizontal tail frame main spar must be notched at the center to

let it rest at neutral incidence on former H. Check the vertical tail frame fit. The main idea is to see that all parts fit properly before covering.

Cover the model completely with aluminum tissue, except the rudder, which is tricolored. Cover the curved wooden parts with small pieces. Now reassemble the parts with cement. Cover, color, and add all remaining detail such as tail skid, head rest, exhausts, vents, etc. The rigging wires are  $\frac{1}{32}$ " x  $\frac{3}{64}$ " bamboo.

### FLYING THE MODEL

For normal horizontal flights, use two loops of  $\frac{1}{8}$ " flat rubber with 2" of slack. For fast, high climbs use three loops of the first length. Test the model carefully until the proper flight characteristics are obtained.

### LIST OF MATERIALS

Miscellaneous	Blocks
1 oz. tube cement	1 $\frac{7}{8}$ " x $1\frac{1}{2}$ "
2 oz. clear dope	2 $\frac{5}{8}$ " x $1\frac{1}{2}$ " x $2\frac{1}{2}$ "
2 sheets aluminum tissue	1 $\frac{5}{16}$ " x $2\frac{1}{2}$ "
2 $\frac{1}{16}$ " x $\frac{1}{4}$ " x 10" bamboo	1 $\frac{1}{2}$ " x $\frac{1}{2}$ " x $1\frac{1}{2}$ "
18" #12 music wire	
6" #10 music wire	
2" $\frac{1}{16}$ " aluminum tube	
4 2" French insignia	
3" sq. sheet celluloid	
60" 1/1" flat rubber	
4 $\frac{1}{8}$ " washers	
	Sheet
	8 $\frac{1}{2}$ " x $2\frac{1}{2}$ "
	1 $\frac{1}{16}$ " x $2\frac{1}{2}$ "
	1 $\frac{1}{8}$ " x $2\frac{1}{2}$ "
	Strips
	6 $\frac{1}{8}$ " x $\frac{1}{16}$ " x 18"
	6 $\frac{1}{4}$ " x $\frac{1}{8}$ " x 18"
	3 $\frac{3}{32}$ " x $\frac{3}{32}$ " x 18"
	1 $\frac{1}{8}$ " x $\frac{1}{8}$ " x 18"

## IMPERIAL LEADS

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18" BALSA 1/16x1/16, 100, 5c 1/16x1/16, 25 for 5c 1/16x3/16, 18, 5c 1/16x1/4, 15 for 5c 1/16x1/2, 5 for 5c 3/32x3/32, 30, 5c 1/8x3/32, 30 for 5c 1/8x1/2, 12 for 5c 3/16x3/16, 8, 5c 3/16x1/2, 6 for 5c 3/16x1/2, 3 for 5c 3/16x1/2, 2 for 5c 1/32x2, 8 for 10c 1/16x2, 8 for 10c 3/32x2, 7 for 10c 1/2x2, 6 for 10c 3/16x3, 3 for 10c 3 sheets or 36" lengths, double above prices; add 10c for pkg. chge. for 20" lengths	18" PLANKS 1x1 5c; 2x2 10c 1x1 1/2 9c; 1x2 10c 1x3 15c; 2x2 18c 2x3 22c; 2x6 39c 3x3 40c; 3x6 75c	1000 in. 6x6 5c 1010 in. 6x6 6c 1015 8 x 8 8c 1/32 6 x 6 15c CLEAR DOPE OR THINNER 5c per oz.; large bottle, 8c; 1/2 pt. 30c; 1 pt. 45c COLORED DOPE 6c per oz.; large bottle, 10c; 1/2 pt. 35c; 1 pt. 60c CLEARCMENT 5c per oz.; large bottle, 8c; 1/2 pt. 35c; 1 pt. 55c PROPELLERS Balsa Paul-O-Mach-Cut Wing 15" 4c 10c 6" 5c 15c 7" 6c 20c 8" 7c 25c 9" 8c 30c 10" 9c 35c 11" 10c 40c 12" 11c 45c 13" 12c 50c 14" 13c 55c 15" 14c 60c INSIGNIA 24 and stripes 5c DOWELS 1/16x6 . . . doz. 5c 1/8x18 . . . 2 for 3c 3/16x12 . . . 2 for 5c WIRE 6-8-10-12-14 . . . 2 ft. 1c WOOD VENEER 20x30 . . . 1 for 10c RUBBER 1/16 . . . 25 ft. 5c 1/8 sq. 15 ft. 5c 1/4 flat . . . 15 ft. 5c Skein . . . 50c 3/16 flat 10 ft. BROWN RUB. 1/4 flat 12 ft. 5c Skein . . . 15c RUBBER LUBRICANT Large bottle 10c PROP. BLOCKS 1/2 x 1/2 x 5 6-5c 1/2 x 1/2 x 6 6-5c 1/2 x 1/2 x 7 7-5c 1/2 x 1/2 x 8 8-5c 1/2 x 1/2 x 10 10-5c 1/2 x 1/2 x 12 12-5c 1/2 x 1/2 x 14 14-5c 1/2 x 1/2 x 16 16-5c 1/2 x 1/2 x 18 18-5c 1/2 x 1/2 x 20 20-5c 1/2 x 1/2 x 22 22-5c 1/2 x 1/2 x 24 24-5c 1/2 x 1/2 x 26 26-5c 1/2 x 1/2 x 28 28-5c 1/2 x 1/2 x 30 30-5c 1/2 x 1/2 x 32 32-5c 1/2 x 1/2 x 34 34-5c 1/2 x 1/2 x 36 36-5c 1/2 x 1/2 x 38 38-5c 1/2 x 1/2 x 40 40-5c 1/2 x 1/2 x 42 42-5c 1/2 x 1/2 x 44 44-5c 1/2 x 1/2 x 46 46-5c 1/2 x 1/2 x 48 48-5c 1/2 x 1/2 x 50 50-5c 1/2 x 1/2 x 52 52-5c 1/2 x 1/2 x 54 54-5c 1/2 x 1/2 x 56 56-5c 1/2 x 1/2 x 58 58-5c 1/2 x 1/2 x 60 60-5c 1/2 x 1/2 x 62 62-5c 1/2 x 1/2 x 64 64-5c 1/2 x 1/2 x 66 66-5c 1/2 x 1/2 x 68 68-5c 1/2 x 1/2 x 70 70-5c 1/2 x 1/2 x 72 72-5c 1/2 x 1/2 x 74 74-5c 1/2 x 1/2 x 76 76-5c 1/2 x 1/2 x 78 78-5c 1/2 x 1/2 x 80 80-5c 1/2 x 1/2 x 82 82-5c 1/2 x 1/2 x 84 84-5c 1/2 x 1/2 x 86 86-5c 1/2 x 1/2 x 88 88-5c 1/2 x 1/2 x 90 90-5c 1/2 x 1/2 x 92 92-5c 1/2 x 1/2 x 94 94-5c 1/2 x 1/2 x 96 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# PRACTICAL MODEL DESIGN

(Continued from page 62)

air flow has changed from direct right-angle flow to a different angle.

We can best demonstrate this by the following experiment. Take a sheet of paper and a pencil and have some one draw the pencil across the paper while you pull the paper back. The result will be a diagonal line. The backward-moving paper can be assumed to be the air and the sidewise motion of the pencil can be the rotating prop.

If the paper or air is speeded up the angle will be steeper. If the propeller is speeded up the angle will be lower. This means that a high model speed and slow propeller will give a steep angle, and a slow model and fast rotating propeller a low angle.

Taking for granted that the air flow has changed as soon as the model moved, we now have aerodynamical forces as shown. Note how the direction of the lift force is determined by the air flow. If in this position the thrust is still greater than the load, the model will speed up and consequently bring the line of air flow still closer to the blade angle.

We definitely know that it is the drag of the model which determines the angle at which the propeller will work. We must, therefore, design our propellers so that they will operate at their best angle. This means that before we carve the prop we must know what characteristics the model has. If the lines are blunt, we know that the propeller must be of low pitch and have plenty of blade area. The low pitch will assure a low angle of attack and the blade area will provide sufficient thrust with minimum of blade drag. However, a streamlined job can use a higher pitch propeller with a fair amount of blade area. Just remember that thrust depends on the blade area, the section and the angle of attack.

Through a process of elimination the following propeller blank was found

most satisfactory. The drawing shows the way in which the blank is tapered before carving. The reason for all this is as follows: We know that the hub contributes very little thrust because of its high blade angle, which produces a lift component which results in torque. So, what we do is to decrease this angle so that it will be a streamlined section following the air flow. This is done by cutting the blank in toward the hub, which automatically decreases the blade angle. Therefore, if we have a five-degree angle of attack at the center, the angle at the hub will be zero. The reason that we start our "X" taper from a mid-point is that we want as much area as possible at the center. As we know, the tips have regular tip losses just like the wing.

You will also note that the tip dimension is slightly changed to give a lower pitch than the center. This is also done to lower the tip losses. The reason that we have such a Venturi shape is that since the propellers work at several degrees angle of attack we have the downward sweep of air, as we have pointed out in the case of the wing airfoil. In case of the propeller this air is sped backward, which reduces the pressure right behind the blades. Consequently, the air outside of the propeller's influence tries to come into the reduced area.

This peculiar pressure radiation leads us to believe that we have nothing to worry about the tips, but experiments have shown that if a silk thread is placed behind the tip it will be sucked forward. You can try it for yourself if you have a gas job. Therefore, be sure to give the tips a very clean elliptical outline.

So far, we have just given the advantages this particular blank design has in the way of thrust. As you will note from the force diagrams, the lower the blade angle, the closer is the lift result-

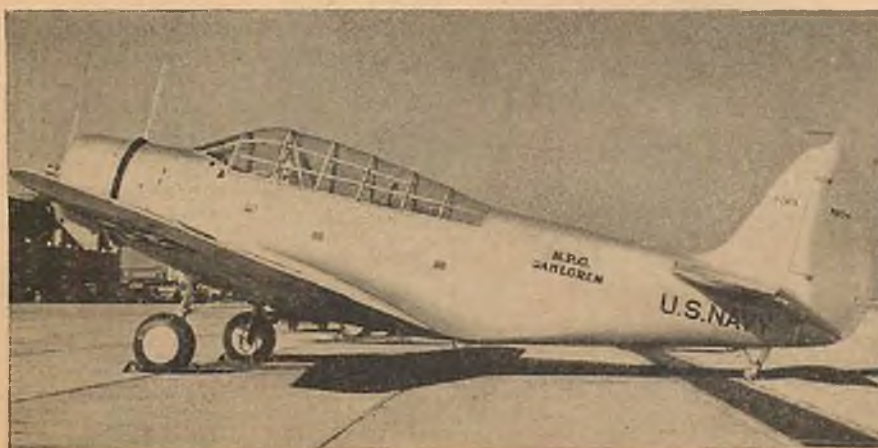
ant to the center line. In case of high angles you will note that this lift is actually a working part of its force against the rotation—so that besides the usual drag we also have this force to overcome by the power. This is another reason why we lowered the blade angle at the hub, and why a spinner will increase the efficiency. If we simply have these forces to overcome by power it would not be so bad, but the pity is that the total of these forces is transmitted to the rear of the motors and it presents itself as our arch enemy, the torque.

In finishing a propeller we must still carry on the idea that we must fit the propeller to the model. As we have learned before, a cambered airfoil gives much more lift at a given angle than the streamlined section. If a model is heavy and bulky, carve in plenty of camber; this is especially applicable to flying-scale models. On a streamlined job you can use just a shade of undercamber. Since every bit of blade drag is made evident in torque it behooves us to give the propeller a very smooth finish with fine sandpaper and doping. It always pays to coat them with wood filler with a final sanding, wet or dry.

The final word will be on "to freewheel or not to freewheel." Freewheeling is unquestionably the desired method. (However, folding propellers are best.) By analyzing the still and rotating propellers we can definitely determine the value of freewheeling. The diagram shows the action of air flow in both cases. On the still propeller the air flow is head-on and it makes the forces as shown. We have a drag and a lift which is translated into a rotating tendency, a poor feature for which we must make counteradjustments.

Now a freewheeling propeller has an air flow which is negative in respect to its flying conditions. This negative angle of attack is determined by the drag the propeller has; the greater the drag, the greater must be the angle to provide sufficient force to keep the propeller rotating. We know that an undercambered propeller poorly finished will need a larger negative angle. Large blade area will also require greater lift force. Therefore, in the case of freewheeling propellers it is essential that we use ball-bearing washers and freewheelings which work on a ratchet or other means which do not use a spring force. Also be sure that the blades are well polished and well outlined.

There is no question but that the propeller is the most important part of the model. It is our only means of changing the energy stored in the twisted rubber into a forward motion. The sooner you decide that you give more time to the propeller, that much sooner you will reach the "expert" class.



The Douglas TBD-1 at Floyd Bennett Field after successfully passing flight tests.



## AIR ADVENTURERS

(Continued from page 33)

which we have reproduced in this department. The other was a row of chemical tanks which are used in spraying poison gas. Actually, they use a lime mixture in their practice flights.

Air Adventurer Jerry Baer of Madison, Wisconsin, gets his photographer's ticket with a swell shot of a Douglas O-46A which he got at Scott Field, Illinois. Jerry explains that the duties of our observation squadrons is to "observe, map and scam"—which is probably the most expressive explanation we have ever run up against.

Barry D. Welsh of Vancouver, British Columbia, who, by the way, is a Junior Forest Warden of Canada, sends us a swell shot of a Junkers and another of a cabin-plane crash which he took while doing his forest-fire rounds. He explains that the ship was crashed by a pilot named Tom Corless who took 52 hours to make his way back to civilization. How the pilot got the ship down in that tangle of pines is a mystery to us. But evidently he did, for he came out to within four miles of where he was heading.

One of the best bits of photography submitted this month is that of a new Spartan Executive 7W which has been sent in by George E. Goodhead of Tulsa, Oklahoma. This is a five-place, all-metal job powered with a Pratt & Whitney Wasp, Jr. George is very interested in aircraft photos and would like to exchange prints with other members. He has about 250 to select from and his address is 1320 So. Louisville, Tulsa, Oklahoma.

Australia comes through again with a swell letter from Bill Lavington of Lidcombe, New South Wales. Bill is loud in his praise of the American planes he sees out there, and what he says about Air Trails almost makes us blush. You know, you have to hand it to those Aussies.

All the way from Honolulu comes word from Leo E. Porter who is busy on a model Sikorsky which will be powered with a Foster motor. We'd like to see that job, Leo. It certainly is different from the usual run of gas jobs. Believe it or not, but Porter has been with

the Pan American Air Lines at Wake Island and is now connected with another aeronautical outfit at Honolulu. He has done over 8,000 miles by air over land and sea.

Harold Giddings of Brooklyn is another flying member. So far, he has been aloft in seven different types and has real ideas for fostering aviation all over the country. He is interested in pen-and-ink drawings of aviation subjects.

Another new member is Jim Gonzabo of Sacramento, California, who says he has just started to notice our Air Adventurers articles, and wants to get in with us. Jim has had an opportunity of going over the new Sacramento airport and says he has been able to get some swell pictures of the hangars and aircraft there.

An interesting discussion on the contents of Air Trails has been forwarded to us by Bob McCourt of Englewood, Colorado. Bob seems to like most of our stuff. He certainly didn't miss much, and we appreciate his constructive criticism. He also came through with applications for three new members.

We started something when we ran Kay Goff's ideas on a new plane for Sandy. Howard Wright of West Sumnerland, B. C., suggests that we create a new craftsman award along that line. He says we should get Sandy a new plane and the members of Air Adventurers should go to work and design one. Howard is also trying to get a course in aircraft navigation.

Here's another from a fair sex member. Mrs. B. J. Putnam, also listed with us as Betty Morton, is a stenographer. She and her husband have scraped their money together and have a Taylor Cub. They have a small private airport where they do charter work and give instructions. The story is too long to include here, but they have a swell bank account, have rebuilt one wing and have repaired a crack in a crankcase. They usually have at least twelve students on their books and even Betty has eleven hours of solo to her credit. "I get tired of hearing people growl about how hard

it is to get into aviation," says Betty. "We started with only our savings, got no outside support and look at us now. We're buying a new ship in the spring." And to prove all of this Betty sends us a picture she took from the air. Believe us, she's getting her craftsman's award on that. Now she wants a set of engine mechanic's questions.

Anthony Tavella of Bridgeport wins his award for a grand detailed account of the improvements that are being made at the Mollison Airport by the city of Bridgeport. Many noted pilots have visited it of late and the new runways will be long enough to take care of the most modern airliners.

Don Gunn should get an award of some sort for an idea of his that many of you will appreciate. Don says that too many members complain about losing their Air Adventurers' pins. "Put it on the garment you wish to wear," says Don. "Then drop a spot of model airplane cement on the catch and let it dry. You won't lose it then."

Justin R. Laing of Joliet, Illinois, is forty-one years of age, but he has sent in his Air Adventurers' membership application. But wait a minute, Mr. Laing has fifteen hours' solo to his credit and hopes to have his private pilot's license by April, 1938. We wish we had a few hundred 41-year-old members like that. We have heaps of room for them.

A grand letter from Francis Keyes of Bedford, Nova Scotia, tells us that he will be on an air trip aboard a six-place Stinson and he promises to send us a picture of his adventures. Francis had a tough time a short while ago when his home burned down. Francis was badly burned about the hands and for a time the doctors thought they would have to amputate several of his fingers, but he hung on and got away with it and still has his full number—ten.

Douglas Valteau of Toronto sends us the most interesting picture of the Imperial Airways Empire flying boat *Cam-bria* while it was drawn into a narrow lagoon for minor repairs. "The *Cam-bria*," wrote Valteau, "is a huge four-engined monstrosity, clumsy yet graceful, ugly yet ruggedly beautiful, poised there like some gigantic bird of prey about to rise and soar majestically above the waves."

Maybe we should institute a new literature craftsman award.

## ATTENTION BILL BARNES FANS!

BEGINNING NEXT MONTH, AS A RESULT OF MANY REQUESTS AND SUGGESTIONS, WE ARE PLACING THE COMPLETE BILL BARNES NOVEL IN ONE UNIT. THIS WILL AVOID TURNING PAGES TO FIND THE CONTINUATION OF THE STORY.



## GLIDING

(Continued from page 25)



The Buxton Transporter

he intends to fly at next year's contest. He plans to overhaul it and add some features of his own.

The boys were doing quite a bit of soaring at Elmira until the snow on Harris Hill stopped their activities. Ships flown were the two-place City of Utica, a Franklin, and the Rhoen Buzard sailplane.

Wistar Brown of the Wings Soaring Club of Philadelphia has obtained his Commercial Glider Pilot license, and recently made his first airplane tow flight in his Goeppingen Wolf sailplane. The pilot of the tow plane, incidentally, was Lewin Barringer.

Chet Decker of Glen Rock, N. J., has bought Barringer's Minimon sailplane.

Three main contest events are scheduled for 1938, according to the reports of the Soaring Society of America: a soaring expedition to northwest Texas, April 8th to May 15th; the 9th Annual National Soaring Contest, April 8th to May 15th; the 9th Annual National Soaring Contest, Elmira, N. Y., June 25th to July 10th; and the American Open Soaring Contest, Frankfort, Mich., August 29th to September 7th.

The annual S. S. A. meeting will take place in Washington, D. C., on February 11th, 12th and 13th.

During the contest sponsored by the Soaring Society of Northern California and held at Bakersfield, Dan Sanborn soared for over an hour with a passenger in his Grunau 8, and Gill Walters stayed up for an hour and a half in his Pegasus sailplane.

The XYZ Soaring Club of Michigan, a newly formed organization, has pur-

chased a Haller Hawk sailplane from Edward Knight.

Now that winter is upon us the boys of the North Jersey Soaring Association are doing their glider flying from the frozen surface of Greenwood Lake, N. Y. Chet Decker, 1936 National Soaring Champion, is the president of this club, and Pete Bonotau, whose article on gliding appeared in the January issue of Air Trails, is also a member.

We have received a letter from Jonas Pyragius, the Lithuanian Silver "C" pilot who participated in our National Meet last year, which may be of interest to all glider pilots and model builders of Lithuanian descent. Jonas Pyragius writes:

"Lithuania celebrates next year the twentieth anniversary since the declaration of its independence. During the celebration there will be arranged National Olympic Games at Kaunas (capital of Lithuania) from July 10th to 24th, 1938.

"One of the features of the program includes aviation in its three stages: power flying, gliding, and model building. This part of the program will be directed by the Aero Club of Lithuania.

"Lithuanians from all over the world are herewith invited to participate in these Olympic Games. An extremely high participation is expected from the United States, as the Lithuanian population there reaches a million men. All American pilots and glider pilots of Lithuanian origin are invited to fly here with ships of the Aero Club of Lithuania. The only condition is a valid pilot's license (presumably a Department of Commerce glider license and a "C" license issued by the F. A. I.) and a timely enrollment. Participants are required to file application directly through the Aero Club of Lithuania whose address is Maironio g-vė #14, Kaunas, Lithuania.

"All participants—power plane, glider pilots and model builders—will receive accommodations, meals and the like free for a period of one month. The model builders are required to bring models of their own construction. The only expenses are traveling expenses and incidentals. The medium cost of the trip, all incidentals included, would be about \$250 for a round passage."



EMIL A. LEHECKA

Emil Lehecka, Silver "C" pilot No. 237, is twenty-three years old and lives in Long Island City, N. Y. He won his Silver "C" during the 1936 Elmira contest with a flight of forty-two miles in his Cadet II utility glider. For the 1937 contest Emil imported a high-performance German Rhonsperber. Peter Riedel, the German soaring ace who participated in the last National contest, acclaimed him as one of the most proficient soaring pilots in this country.

Besides being a soaring pilot, Emil is an accomplished glider aerobist. He can put his Cadet through a stunting exhibition equal to the best work of any power-plane stunt man. His rolls, loops, whipstalls and inverted spin—a maneuver extremely difficult and hazardous in a power ship—won praise and admiration from Tex Rankin, the international stunt champion.

Emil learned to fly gliders with the Bowlus-Hirth School in 1931, at which time he also took up power-plane flying. Now he holds not only a commercial glider license, but a power-plane transport ticket as well. He has approximately 1,000 hours of airplane time and over one hundred hours to his credit in gliders.

He is chief instructor for the Airhoppers Glider Club of Astoria, N. Y., of which organization he is also an active member.

At the 1937 National Contest, Emil tied third place with Chester Decker, the previous year's soaring champion, and won the Bendix Bronze Trophy for the third greatest distance flown during the meet—109 miles.



Interior of the administration building at Elmira.



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## ARE YOU INDOOR GREEN?

(Continued from page 57)

Mine's doing 55." These fellows were referring to the number of times their propellers were turning over in a minute. Experts try to cut down on the number of RPM of their propellers in order to increase their duration. However, at least up to the present, the airplanes which are the most consistent fliers and the ones which hold the records have RPMs of close to 70 at cruising. At 70 RPM the maximum potential duration is approximately thirty minutes. This is good enough for any builder and with such an RPM one is assured of a consistency not obtainable with the slower speeds.

Another way one can tell that a fellow is an expert builder is by the way his plane flies. That is, is the propeller turning over smoothly? Is the ship flying smoothly? If the model jerks around, if the wings are twisted at many different angles, then the airplane does not belong to an expert. Rubber energy is lost in overcoming these faults and does not go into keeping the ship up. An expert will see that his wing, tail and rudder lines up and, most especially, that his propeller is balanced and doesn't jerk his ship.

Indoor flying has gotten the reputation of being a winter sport. However,

winter is by no means the ideal time to do your indoor flying. (Undoubtedly it has obtained this reputation because the season makes it hard to fly outdoors.) Cold draughts through open doors and the sun beating down on the roof cause a motley of up-and-down currents all over the armory which interfere with the flight. Models go up on practically no winds, come down fully wound, or fly into the rafters because of these unknown quantities. The only thing that can be done about it is to know your armory. To test for up-and-down draughts and side gusts which will send the plane into the rafters, wind your model only half way and fly it from different parts of the floor. Observe the flight. Then if a suitable place is found (the least up-and-down draughts), wind your model more and more on each succeeding flight so that it can test the air currents aloft. Another safety measure is proper winding. That is, winding so that the model will go high but will not stay up long. In other words—obtaining a burst of power at the start. This is done by winding the model with the rubber only slightly stretched, and with no lubricant. Using a shorter rubber length is also useful, inasmuch as it

reduces the load that the plane has to carry. For maximum winds and long flights the rubber should be stretched about seven times its own length, and the winds should be put in at an even speed and not too fast. Of course, rubber lubricant should be used as it allows putting in a great number of winds and it preserves the rubber by reducing the friction of the strands on each other.

In experimenting with double surfaces you must consider both thick and very thin airfoils with deep camber and also apply them to propellers. Very flexible trailing edges are suggested in order that a greater lift be obtained at the slower speeds. This entails moving the rear spar forward. Tests should then be made to find out if it is best to have the spar above or below the microfilm surface. Drag tests should be made to see if it pays to put spars on edge, or even if it pays to make cantilever wings. Automatic-pitch propellers of the type described in an earlier issue should be more completely investigated in order to increase propeller efficiency. Tandem-wing types is not a new idea, but it could bear further investigation. New to indoors is the lifting type. Tests made on a model showed that at stalling speeds the fuselage lifted in direct proportion to its area and at low angles of attack the fuselage supplied as much as 91% of the total lift.

Please mention AIR TRAILS when answering advertisements.



## EUROPE PREENS HER WINGS

(Continued from page 13)

area or regional control; or whether this government scheme is the result of the slackness and lack of progress, I cannot say. But I do know that many consider the arrangement is approaching perilously close to the appointment of *Komissars* in the Russian fashion.

This brings us to the great enigma—Russia. To attempt to compute the air strength of Russia would be tempting all the fates, for it is impossible to get any sort of a straight story, beyond the actual details of the system under which the Russian Air Service operates. How many planes they have and what their quality is, no one knows. We do know, however, that most of their successful types—the types seen on the Spanish front—are out-and-out adaptations on noted American types. They have produced one single-seater which has stood up well, but beyond that the Russian Air Service appears to be nothing much better than that of a third-class power. Great bombers, however, have been produced in enormous quantities.

Their schools, at least those I saw, were comparable in general respects with those of the United States. But the students and staff did not have the same trim discipline or such a careful program of air drill. Russia, on the other hand, *may* be the world's most powerful air power, but so far we have had nothing concrete on which to base that assumption.

When one reaches Europe, that is when one goes to Europe via Great Britain, one naturally sees the British service first. As I said, I may be prejudiced in the matter of my opinion of the British service, but we cannot deny facts. Today, the Royal Air Force is probably the finest service in the world, especially when we must consider that the rest of the Empire is so tightly bound to the Mother Country and that every colonial air service is nothing more than a branch of the R. A. F. They have the machines, schools and a splendid service with a great tradition.

The present British rearmament plan began back in 1936 when Great Britain was generally considered a poor fifth among the world's air powers. Here we note particularly the move toward the high-speed fighter bomber, for today great factories are busy turning out more Fairey Battles, Bristol Blenheims and Vickers Wellesleys—all impressive fighter bombers. It is true that they still have a number of fighter squadrons and are equipped with first-class planes. But to the most ordinary observer, it is clear that the bomber, as a war weapon, has come to stay. The British idea of defense today, and they say it

with a wary eye cocked across the North Sea, is: "Bomb them out, before they can get away to bomb us."

Single-seaters are considered only as a local defense, most of them being in the fast-climbing interceptor class. The much-advertised Supermarine Spitfire is still undergoing certain changes, although there is no doubt that it is the fastest single-seater fighter in the world. The present Hawker Furies, Gloster Gladiators, Gauntlets and Bristol Bulldogs are still standard. But the new Vickers Venom may soon line up with the Spitfire as a first-line interceptor. Then, too, the Hawker Hurricane must be considered.

One of the most amazing indications of Great Britain's race for air supremacy may be noted in the recent order for 400—get that, 400—of the new Blackburn "Skua," a new dive bomber

R. A. F. pilots rush for their ships in practice maneuvers.



intended for the Fleet Air Arm. This amazing ship is a low-wing monoplane carrying a crew of either two or three. It uses the new Bristol "Perseus" engine, a nine-cylinder sleeve-valve engine. The plane's wings fold for stowage aboard carriers and, in addition, she carries an extensive supply of navy equipment suitable for her work. No details of the actual performance of the "Skua" have been given out.

The British manufacturers are enjoying a mad race for speed in their day and night bombers. So far, the new Bristol Blenheim, a twin-engined monoplane, seems to be tops with a speed of 279 m.p.h. at 20,000, while the Fairey Battle does 250 at that height. The Handley Page "Harrow," a night bomber, does 200 at 10,000 and is being replaced by the Handley Page "Hamptden" which is said to be much faster.

To get the full effect of the British scheme of rearmament in the air, one should have some idea of the new "Shadow scheme" which has been incorporated into the aircraft industry. The "Shadow scheme," as far as the British are concerned, was evolved in

1936. A similar scheme has been established in the United States for a number of years, but it has not been played up. In the British plan a number of motor manufacturing firms, known to be particularly efficient in their own lines, were asked by the Air Ministry to build new factories at the Air Ministry's expense, and to manufacture in these new plants certain types of motors and planes selected by the Air Ministry. The original designers and builders of these planes and engines supply drawings, sample tools and jigs to the Shadow factories and in turn are paid royalties on the number of units turned out.

The general idea, of course, is that, should an emergency arise, all the Air Ministry would have to do would be to flash a signal to the Shadow factories and they would begin turning out planes and engines. So far, the Bristol "Mercury" engine has been chosen as the representative engine and the Fairey "Battle" and the Bristol "Blen-

heim" are the first planes on the list. The factories already in the Shadow scheme are the Austin Motor Co., the Daimler Motor Co., Rootes Securities, Ltd., the Rover Motor Co., and the Standard Motor Co. Already a number of planes have been turned out under the Shadow scheme and the idea seems to work.

On the surface of things, the system seems ideal and very wise. But many British experts take the attitude that while the Shadow scheme is good, and will be good for a few years, they point out that unless complete changes in jigs, tools and equipment are made every eighteen months or so, the Royal Air Force will be faced with the prospect of flying planes that are obsolete, should war break out in five years. There is much to this, of course, and we do not know what the Shadow scheme plans are for improving the models or adding new ones should the expected emergency be delayed several years.

All told then, Great Britain appears to be the best equipped air power in Europe. There is no question but that



John Bull is expecting and preparing for war. He has tried to police the warring factions for years, but two or three of them appear to have gotten out of hand. Britain has tried to keep her temper—while she builds up a defense—and it now appears that the dictators who once threatened her have missed their chance. They might have gotten away with it in 1935, but it is too late now.

Regardless of what we may think, or what our personal prejudices are, we cannot ignore the Royal Air Force system and its tradition.

Most certainly Britain has preened her war wings.

In contrast to Britain, we must next consider Germany.

No one over here ignores Germany as England's most dangerous enemy. Many Englishmen try to laugh it off and attempt to give the impression that Germany is really England's best friend. Many of the great aviation writers here continue to harp on this one string. But the man in the street, the man who knew War in 1914-18, will not be talked down. He knows the German is a plodding, methodical worker and a great tactical soldier. He also knows that Germany still holds a grudge for England's interference in 1914. Hitler knows that to hold his place in a wobbly nation, he must do something to humble the nation across the North Sea. It may be just a demand for the return of colonies. It may be the continued threat of an air force, raised in contempt for the Treaty of Versailles. If he could, or dared, stage a series of air raids on London, he believes he could solidify the German people into the same national body that encouraged the Kaiser to take his momentous step in 1914. This, at least, is the impression I get from those in Britain who should know.

They are sure that it will be by air, for the present German navy is not powerful enough to attempt a conflict in the North Sea. Her army is not ready for a foreign invasion, because she does not have a Mercantile Marine large enough to support it. If they are to hound Britain then, it must be by air.

This explains, of course, why the British are sticking to their interceptor types, rather than the pursuits as we know them.

What, then, does Germany have in the way of an air force?

In the first place, the zeppelin, as a weapon of war, has had to be counted out. There is only the *Graf Zeppelin* left of a long and noble line of dirigibles, and the old *Graf* is about through. The new one will not be ready until late in 1938, owing to the many design changes which have had to be made to accom-

modate the use of helium instead of hydrogen.

It is in bombers that Germany has shown the most progress in her efforts to create an air force. Much of this, of course, is due to the fact that for years she has been the leading European air transport nation. We have only to study her military types today to see how they have been adapted from former commercial machines.

Take, for instance, the new Dornier Do.17 which is a high-performance monoplane powered with two 950 Daimler-Benz engines. This ship shows all the well-known characteristics of the Dornier planes, in land-plane form. Carrying one ton of bombs, it has a top speed of 265 m.p.h. and a range of 1,500 miles—sufficient to cross the North Sea and back with plenty to spare. Another Dornier, the Do.19, is a four-engined bomber giant using the new 650 h.p. Bramo radials. It is said to have a top speed of 197 low down and 236 at the rated altitude of the engines. This should compare favorably with our Boeing YB-17. How many of these Germany can build and put into the air within eighteen months is a question.

The Focke-Wulf "Wiehe," or "kite," is a two-engined ship which seems to be the jack-of-all-trades. It can be used for advanced training, bombing or all-around fighting. The noted Heinkels, which were developed years ago as high-speed postal planes, are now regulation equipment as two and four-engined bombers. The He.111 uses two 660 B.M.W. engines and has a top speed of 214. The latest, the He.116, while still rated as a long-range mail and freight carrier, is no doubt a potential four-engined bomber with a range of 2,795 miles and a top speed of 205 m.p.h. On top of this, they have the old stand-bys, such as the Junkers, in various designs and speeds.

Her single-seater fighters are being improved over the earlier Arados and Focke-Wulfs of the 1936 era. One of the most interesting is the new Heinkel He.112, a low-wing single-seater powered with the 660 h.p. Junkers Jumo 210, which is an inverted, water-cooled twelve-cylinder job—not the Diesel type, so well known. It carries two fixed machine guns set low and firing through the air-screw arc and two other automatic guns set in the wings outside the arc. It is said to have a top speed of 292 m.p.h. I have also heard of two new Henschels in high-wing form which use the same engine, but which are also equipped for dive-bombing, as well as high-altitude fighting. They are supposed to have a top speed of 265 m.p.h.

Another, and yet newer type, the Messerschmitt Bf109, is said to have hit 379 m.p.h. with a suped-up 950 h.p. Mercedes Benz.

Another interesting type found in the German service is the Heinkel He.170K, a two-seater bomber-reconnaissance ship, using the 910 h.p. Daimler-Benz. It is, no doubt, an adaptation of the earlier Heinkel He.170 transport plane, but it looks very formidable. Then there is a Henschel two-engined fighter which is on the secret list, but looks much like a Lockheed-14 with a rotating nose-turret. The same company puts out a He.122 general-purpose monoplane. Many new firms have cropped up in the last few months that are producing military types. There is the Halle company putting out a twin-engined transport which looks suspiciously like a short-range bomber. The new Hamburg company has produced a low-wing single-seater fighter with airfoils that are strangely gull-winged. It uses the Jumo-210 and looks very hefty. It is said to do 205 m.p.h. The same company is also putting out a four-engined catapult seaplane which may come in handy for long-distance bombing.

In summing up Germany's preening of her war wings, one gets the impression that she has attempted too much in a short time. We know how many types, produced in the period of one year, can pass the most rigid tests—very few, at least in the United States. One cannot help but wonder what these machines would do under actual service conditions. It is obvious that in the short time Germany has been working for an air force, she cannot have had time to fully test and check them all. What is even more serious, she cannot have had the time to train pilots and observers in the many intricate subjects so necessary for modern air warfare.

Still, as I have said, one cannot compute these things today. We can only guess and base our assumptions on past history. What might be the thing—the rule—in 1918, may be just the opposite in 1938.

From Germany, our eyes naturally turn to France, the traditional enemy of Germany. If Germany and Italy combine forces and attempt to join borders, as we have been told, France will have to fight. Unfortunately, France is the least prepared of all, if we are to believe all we hear—and see.

Certain national crises which have shook France during the past two years appear to have broken her morale. It is no secret that France has been on the verge of national bankruptcy on several occasions. What money she has had to spend has been put into army equipment, the much-vaunted Maginot line forts and into keeping her navy up to some semblance of efficiency. Individual enterprise has been stifled by the aforementioned Nationalist group plan.



The French Naval Air Arm has been improved but little. They still have but one aircraft-carrier, and only a second-class vessel at that.

The air service itself appears to be at a complete standstill. We see the same Dewoitine D-500s, Mureaux 115.R2s and the flimsy-looking Nieuports doing the *Chasse* duties. The Hanriot pusher, of which so much was expected, has folded up and has been forgotten. In the new Breguet 462-B-4, the multi-seat "Vultur," we find one spark of hope, for this low-wing monoplane with the two Gnome-Rhone engines is listed as a bomber-fighter and appears to be all that. With a complete, a very complete military load which includes many machine guns and one light automatic cannon, it has a top speed of 238 m.p.h. The rest are revamped Marcel Blochs, freak Amiets and even freakier Farmans.

That is all France has to offer in the way of an air service at present and it is no wonder that Italy has taken such a belligerent stand in the face of a dual-threat of Great Britain and France. If war comes in the Mediterranean, France will not offer much in the way of an up-to-date air force.

This point brings us to Italy, the enigma of the Mediterranean.

In the past three years, Mussolini has apparently built up a great air service in contrast with what Italy boasted at the end of the World War. Its strength lies in its number of high-performance, long-range bombers and efficient flying boats. The former have been developed over a long period of years, and further improved in the so-called Ethiopian campaign.

The flying boats came naturally, for Italy has considerable coast line in proportion to her actual area. It was obvious from the start that such craft would be required to maintain supremacy in the Tyrrhenian and the Adriatic Seas. We have seen what Italian flying boats can do in the way of long-distance mass flights and we know what they have been able to do in the way of speed and distance records. But while Italy has had what might be considered active service in the Ethiopian and Spanish Civil War campaigns, most European experts do not consider her a major air power. Whether they are adopting the well-known attitude of the ostrich is a question, for most certainly on paper, at least, Italy seems to be one of the leaders and a real threat to British supremacy in the Mediterranean.

It is in the strength of her bombers, which are actually fighter-bombers, that Italy excels even Great Britain. She has more and they are of high quality. They are well-armed and appear to fit a wide range of duty remarkably well. The Caproni 101 bomber—a three-

engine, high-wing monoplane—has been one of the stand-bys for about three years and it is still a good ship. It carries four machine guns and several types of bomb racks. The amazing thing about this ship is the fact that with three light 370 h.p. engines and a wide range of military equipment, the Italians claim she does 255 top. There are several versions of the Caproni, all designed inside for particular jobs. In this way the Italians have reached one of the all-important stages in standardization.

The Breda-46 is another fine low-wing bomber with a top speed of 195.6 m.p.h. It is ironical that she uses British Pegasus engines made in the Alfa-Romeo factory. The latest Breda bomber is the new Breda-82, using two 1,000 h.p. Fiat radials, and which is said to do 204 top. It has three gun positions and uses interior bomb racks. A new Caproni, the Ca.135, is said to be capable of a top speed of 258 m.p.h., using two 900 h.p. Isotta-Fraschini "Asso" water-cooled engines. This is one of the finest machines of its type in Europe. The Piaggio firm is still working on the P.32 high-performance bomber which is powered with two 1,020 h.p. Piaggio radials or two "Asso" motors. The Savoia-Marchetti firm continues to turn out the S.79B and the S-81 land-plane bombers, as well as a number of first-class flying-boat ships.

We find comparatively little improvement or advances in Italian fighters. They still use the Fiat C.R.32 and a Bergamaschi A.P.1 single-seater, which is an attack plane, or contour fighter. The C.M.A.S.A. firm has produced a single-seater fighter known as the G-50, using the 850 h.p. Fiat engine, which is said to do 285.6 m.p.h. The new Meridionali firm has offered a fighter biplane, powered with the 700 h.p. Fiat, which has a top speed of 201. The same firm has also produced two two-seater reconnaissance planes and a trainer fighter, all biplanes.

The Italian Air Force may be a mystery, a fatal mystery to some of the European powers. I personally believe the Italian service is stronger than Germany, and far superior to France—at least in numbers. How well the pilots are trained is quite another question, for many over here do not have much that is good to say for them. At any rate, Italy is one of the great air powers that no doubt will play a great part in the next European war.

To comment on the status of Russia as an air power is impossible. No information, that is reliable, is available anywhere. Here in Europe you can read ten articles on the subject in one week in as many periodicals and get as many different opinions. What I saw personally was interesting, but not sufficient to attempt to offer a reliable

opinion. The most impressive fighter the Russians have offered of late is the new 300 m.p.h. Z.K.B.19, using the M-100 "cannon-engine." It is a low-wing monoplane which appears to be using the Hispano-Suiza cannon motor. It has retractable wheels, a covered cockpit and lines of the British Spitfire. Another fighter is the I.5 single-seater biplane, using the 480 h.p. M-22 engine which looks like an early type Curtiss Hawk, and probably is. From information I received in Russia I learned that they have ground-attack, two-seater fighters, reconnaissance, seaplanes, bombers and single-seaters in their service.

Fantastic stories, and even more fantastic figures, are all one gets when one asks questions about the Russian Air Force. If the figures are only slightly exaggerated, we can look for flocks of war wings from Russia if, and when, war breaks out again.

The smaller countries of Europe mean much in this weird plan of air action. Belgium, which has patterned its force from that of the British, is small but well fitted out. In case of trouble with Germany, she would no doubt cast her lot with England.

Holland, where the Fokkers and the Koolhovens come from, has one of the finest air services in the world. The Fokker "Reaper" has been ordered to augment the Fokker F.K.52s, the D.21s and C.10s. Tony has also presented a new fighter-bomber known as the T-5 which uses two Bristol Pegasus engines. Holland may be able to keep out of the promised conflict, as she did in the last, unless Germany makes a side trip through her territory to get at England or France. It is inconceivable that the Netherlands would ever join up with Germany.

Poland is another small but powerful air nation. Compared to the others, she has devoted much of her attention to fighter types made by the P.Z.L. (Panstwowe Zaklady Lotnicze), the Polish National Aircraft establishment at Warsaw. Most of these planes are high-wing, gull-wing fighters. But of late they have developed a particularly interesting three-seater, long-range bomber-reconnaissance low-wing monoplane using either the Pegasus or the Gnome-Rhone 14No. engine. Three versions of this ship have been put out and they may cause trouble, if events along the Polish Corridor are ever detonated.

This, then, is my story of what Europe and Great Britain are doing in the development of their war wings. They are being preened to the *nth* degree and it requires but little to drive the war birds out of their aeries.

Who will win?

Like all events of this kind, it will all depend on who plays who.



# WHAT'S YOUR QUESTION?

(Continued from page 27)

pontoons could be retracted, but you have a different problem to face than that concerning the retraction of wheels. If you retract them to cut down frontal resistance, you must have somewhere to put them, and pontoons will take up a lot of space in a fuselage that could be used for other purposes. If you retract them into the wings, you present a wing-spar design problem, for the pontoon will have much more depth than the thickness of the wing. Actually, except in a costly racing job, there is very little to be gained as yet. The Twin Wasp diameter ring is  $23\frac{3}{8}$  inches. Its height is 48 inches. The length without the starter is  $53\frac{1}{2}$  inches. Its dry weight without hub or starter is 1,235 lbs., and r.p.m. is 2,450, according to the manufacturer's report.

**Question:** Could you tell me how much a pair of goggles with corrective lenses would cost? Are these Navy PBV-1s that are being sold to other nations fitted up the same as those sold to our government? What is the altitude record now and who holds it?

**Answer:** Corrective lens goggles differ in cost like eyeglasses. They might cost you as high as \$50.00. I suggest that you first consult a Department of Commerce physician. As far as I know, all military planes sold to the export trade are almost identical with those sold in America. In a few cases the engines are changed, but the purchasers can stipulate any power plant they wish. The present altitude record is held by Great Britain. It was made on June 30, 1937, by Flight Lieutenant M. J. Adams, R. A. F., in a Bristol monoplane powered with a Pegasus engine. The new accepted mark is 53,937 feet.

**Question:** Can you tell me what it would cost to learn light airplane designing and where could it be learned? E. P., Glendale, Arizona.

**Answer:** There is no such thing as a light airplane designing course. You would have to take a full designing

course at a rated school or university and then specialize later on in light planes. Such a course could be obtained at any of the colleges offering aircraft designing courses.

**Question:** Is it true that flying boats such as the Sikorsky S-42 have to land at half throttle? If so, why do they? L. S., Jr., Lock Haven, Pennsylvania.

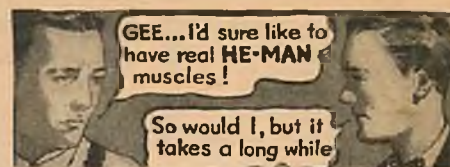
**Answer:** Landing conditions change with the weather. I presume that a situation often arises where one requires considerable power to land under full control against high wind—possibly as much as half throttle, at times. But this is not the general rule, most certainly not in dead calm weather.

**Question:** Is there an age limit, that is a maximum age limit, for commercial or air-line pilots? E. D., Belleville, New Jersey.

**Answer:** As far as I can interpret the air-commerce rules there is no maximum age on commercial licenses, but this is taken care of by the regular twice-a-year physical examination. With care, an air-line pilot should be able to hold his license until he is well past forty—perhaps past fifty.

**Question:** How does the bottom gunner on the new Boeing Bomber sit, or lie? Does the Great Lakes Corp. make sport planes any more? Where can I get a glider? P. P., Fort Wayne, Indiana.

**Answer:** Details of the interior of the new Boeing Bomber are still on the secret list, but I believe the rear gunner has two positions, one a standing position, so that he can fire over the tail, and another, prone, which allows him to fire under the tail. The Great Lakes Corp. is well tied up with navy contracts and their only light-plane work is confined to two-seater trainers for the navy. For further details on gliding, other than that found in our magazine, write to the Soaring Society of America, Inc., 1,500 Locust Street, Philadelphia, Pennsylvania.



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center of the tube. Therefore, the resulting incidence of the wing is four degrees, the elevator one degree. He usually estimates the amount of down- and right-thrust when cutting the nose-plug of the model. But invariably this adjustment has to be corrected when the model is actually flown.

### CONSTRUCTION NOTES

Construction of the Mulvihill Winner is clear from the drawings. Simplicity is the keynote of the design and beginners should have little trouble duplicating this model.

Power—use 24 strands of  $\frac{1}{8} \times \frac{1}{30}$ " brown rubber, 24" long.

Propeller—cut from hard balsa. Add  $\frac{1}{8}$  to  $\frac{3}{16}$ " camber in the rear face of

the blade. After smoothing with rough sandpaper, polish the propeller with 10-0 sandpaper with intermittent coats of dope. The finished propeller should have a high gloss. Metal propeller guards are cut from tin-can metal.

Rudder—the airfoil is flat. Do not attach the rear portion of the rudder to the tail boom. Change the rudder setting by warping the rear rudder. Don't water dope the tissue on the rudder. If the tissue is stretched too tightly, it will distort the shape.

Wing-Saddle—rests flat atop the motor tube. Cement two pieces of tough  $\frac{1}{16}$ " sheet to form a V. Attach the .045 wire clips to this V with cement. Insert the other ends of the clips into the leading and trailing edges

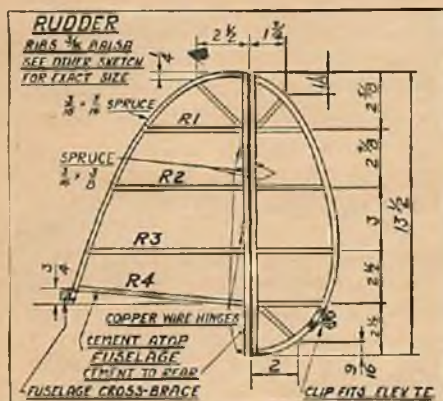
of the wing. The wing saddle is permanently attached to the wing.

Assembly—hold the wing, tail boom, and nose block in position with rubber bands. The elevator is firmly cemented to the tail boom. The rudder is attached to the top of the elevator. Reinforce the rudder with a light bamboo strut, extending from the leading edge of the elevator to the leading edge of the rudder.

The Mulvihill Winner is an interesting design. It will be interesting to learn about the flights that it turns in. Write and tell us about your version of this contest winner. Dague will give you the benefit of his three years' experience with this type model by advising us on the answers to any questions which might arise.

## WORLD'S RECORD GAS MODEL

(Continued from page 46)



indicated in the drawing. The first step is to join the center-section spar to the tip spars. Add the balsa gussets (H) and cement and bind the joint thoroughly. This operation is repeated with the leading and the trailing edges.

Next add the ribs to the spar. After checking for alignment, add the leading and trailing edges. First complete the center section—keeping the wing flat on the workbench during the process. Then finish each tip—resting it flat on the bench until completed. Don't forget to insert the two spruce strips to the inside of the leading and trailing edges. These pieces support the wing saddle and must be cemented and bound securely.

### WING MOUNT

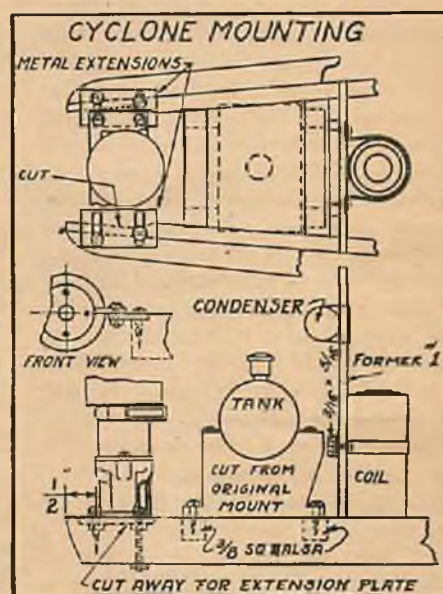
Many of the successful characteristics of the model can be traced to the parasol design. Therefore, it is important that the wing be mounted above the fuselage in the position indicated. First make a full-size sketch of the wing saddle. It will be convenient to use in checking the shape of the wire. It is a rather difficult job to bend  $\frac{1}{4}$ " piano wire, especially since the finished saddle must hold the wing in a very definite position—zero incidence. The

interbracing— $\frac{1}{16}$ " wire—is soldered and bound to the main supports. Balsa fairings are added to supply additional rigidity and streamlining. Flat strips of spruce are added to the bottom of the wire saddle where it rests on top of the fuselage. Small sheets of cork or rubber, glued to the bottom of these pieces, will cushion the bearing on the fuselage.

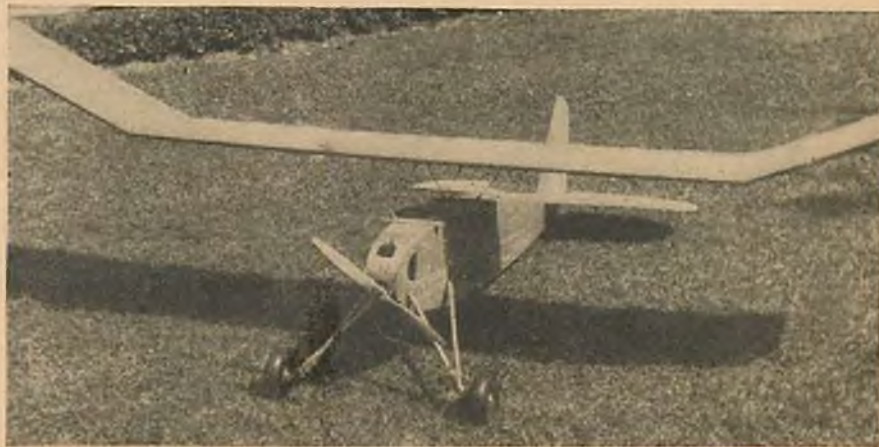
### COVERING

All surfaces touched by the covering should be sanded smooth. When cutting the bamboo paper covering, allow about  $1\frac{1}{4}$ " overlap. The paper should be stretched tightly, using pins to hold it while the cement is drying. It will not be necessary to cement the paper to every rib or strut since the dope will penetrate the paper.

Apply dope in a dry, warm room to prevent "blushing." Make sure there is no dust in the air—it will fall on the wet dope and roughen it. Use a soft brush and lightly stroke the dope over the paper.



Colored dope can be applied after the first coat of clear. As many as three or four coats will be necessary to give a smooth, clear gloss. After each coat, rub the surface with 10-0 sandpaper. Take care not to sand through the paper—especially where it contacts the structure.



The model has by its many convincing victories established the superiority of Bassett designs.



## FLYING

First balance the model before attempting any flights. The center of gravity should fall about  $3\frac{1}{2}$ " back from the leading edge of the wing. The rudder should be set straight. The wing should be at zero incidence—that is, the flat undersurface of the wing should be parallel to the center fuselage longeron. The elevator should have about 1 or 2 degrees negative incidence.

Now try a glide—launching the model from about six feet. Launch the model in a slight nose-down position. Watch the action in the glide. If it stalls, move the wing back a trifle. Be sure you maintain the zero angle in the wing. The curved, top portion of the fuselage will necessitate inserting blocks under the front or rear if it is moved from the original position.

Carefully regulate the motor run to about 30 seconds. With the motor turning about half speed, head the model into the wind. Use as little power as possible for the trial flights. Since the model has such a slow flying speed, do not shove it violently as it is likely to result in a stall. Regulate turn by rudder adjustment. Warping the wing is unnecessary. The model seems to perform the best when turning in 200-300 foot circles. The weight of the model, ready to fly, is four pounds.

Maxwell Bassett's championship model is manufactured in kit form by the Scientific Model Airplane Company of Newark, N. J.

## MATERIAL REQUIRED

## Fuselage

- 5  $\frac{1}{2}$ "sq.x48" longerons, balsa
- 7  $\frac{3}{8}$ "sq.x36" upright-braces, balsa
- 5  $\frac{1}{4}$ x $\frac{3}{8}$ x36" cross-braces, balsa
- 2  $\frac{3}{8}$ x $\frac{3}{4}$ x52" main longerons, balsa
- 2  $\frac{1}{4}$ x $\frac{3}{4}$ x15" motor mounts, spruce

- 4  $\frac{1}{4}$ x $\frac{1}{2}$ x1 $\frac{1}{2}$ " inserts, spruce
- 1  $\frac{1}{8}$ x2x36" nose of fuselage, balsa

## Landing Gear

- 2  $\frac{1}{4}$ x $\frac{9}{16}$ x8 $\frac{1}{4}$ " front struts, spruce
- 2  $\frac{1}{4}$ x $\frac{9}{16}$ x11 $\frac{1}{2}$ " rear struts, spruce
- 24"  $\frac{1}{8}$ " diameter piano wire axles
- 12"  $\frac{1}{16}$ " diameter piano wire shock absorbers
- 24" #28 gage galvanized irons or steel  $\frac{1}{2}$ " wide strut ends
- 4 machine screws and nuts  $\frac{9}{16}$ " long
- 4 machine screws and nuts  $\frac{7}{8}$ " long
- 1 pr. 3 $\frac{3}{4}$ " diameter airwheels
- 12"  $\frac{3}{32}$ " diameter piano wire tail wheel strut
- 1 1 $\frac{1}{2}$ " diameter airwheel tail wheel



Maxwell Bassett and  
1937 trophies.

## Elevator and Rudder

- 2  $\frac{3}{16}$ x $\frac{7}{16}$ x36" longerons, spruce
- 3  $\frac{3}{16}$ "sq.x48" outlines, spruce
- 2  $\frac{3}{16}$ x $\frac{3}{8}$ x14" rudder spars, spruce
- 5  $\frac{1}{16}$ x $\frac{3}{16}$ x36" elevator ribs, spruce
- 1  $\frac{3}{16}$ x2x24" rudder ribs, balsa
- 12"  $\frac{1}{16}$ " diameter soft copper wire rudder hinges
- 1 machine screw and nut  $\frac{3}{8}$ " long rudder clamp
- 1 3x $\frac{3}{16}$ x#28 gage aluminium rudder clamp

## Wing

- 1  $\frac{1}{2}$ x1 $\frac{1}{8}$ x51 $\frac{1}{4}$ " center-section spar, balsa
- 2  $\frac{1}{2}$ x1 $\frac{1}{8}$ x29 $\frac{7}{8}$ " tip-section spars, balsa
- 1  $\frac{3}{4}$ x1 $\frac{1}{8}$ x51 $\frac{1}{4}$ " center-section L.E., balsa
- 1  $\frac{1}{4}$ x $\frac{5}{8}$ x51 $\frac{1}{4}$ " center-section T.E., balsa
- 2  $\frac{3}{4}$ x $\frac{7}{8}$ x28 $\frac{3}{8}$ " tip-section L.E., balsa
- 2  $\frac{1}{4}$ x $\frac{5}{8}$ x27" tip-section T.E., balsa
- 2  $\frac{3}{16}$ x $\frac{1}{4}$ x15" wing supports, spruce
- 2  $\frac{1}{4}$ x $\frac{3}{16}$ x18" tips, spruce
- 22  $\frac{1}{8}$ x2x13" ribs, balsa

## Wing Mount

- 2  $\frac{1}{16}$ " diameter piano wire x 24" long
- 4  $\frac{1}{16}$ " diameter piano wire x 18" long
- 1  $\frac{5}{32}$ x $\frac{1}{2}$ x24" strut fairings, balsa
- 2  $\frac{7}{32}$ x $\frac{3}{4}$ x51 $\frac{1}{4}$ " fuselage rests, spruce

## Motor Cowl and Installation

- #28 gage aluminum 3x10" hatch
- 4 #28 gage aluminum x $\frac{1}{4}$ x8" battery and cowl mounts
- $\frac{1}{16}$ " diameter piano wire x4" long hatch hinge
- sheet steel or brass (about  $\frac{1}{16}$ " thick) motor mount extensions

## Additional Items

- 30 ft. rubber for wrapping
- solder and soft wire for wrapping
- 12  $\frac{3}{8}$ " wood screws
- 12 sheets bamboo paper
- 1 pint cement
- 1 quart dope
- 1 spool of coarse thread

## R.A.F.'S NEW LIGHT BOMBER

(Continued from page 35)

A hollow, balanced crankshaft rests in seven special lead-bronze bearings and is fitted with a spur-type reduction gear having a ratio of 0.477:1.

Both models are cooled with Ethylene-Glycol compound, passing through tunnel-type radiators, and are designed for 87 octane fuel. They have a bore of 5.4 inches, a 6-inch stroke and a compression ratio of 6:1. Fully supercharged, the "Merlin II" develops 890 h.p. at 2,850 r.p.m. at sea level for take-off. Its maximum output is 1,030 h.p. at 3,000 r.p.m. at 16,250 feet altitude. It consumes 90 gallons of fuel per hour and 10 to 16 pints of oil.

The construction details of the light bomber are generally similar to those of the "Battle." The fuselage is of semi-monocoque design, with a steel-tube

structure as far back as the gunner's pit and a full monocoque tail. The covering is stressed, flush-riveted aluminum plate. The P.4/34 is fitted with a tunnel-type radiator slung under the engine compartment. This installation is provided with an air-control flap in the rear and contains both chemical and oil-cooling cores. The wheels are equipped with Lockheed hydraulic retraction gear which may be operated mechanically in emergencies. Swiveling landing lights are mounted in the leading edge of the wing. The forward firing armament consists of a .303-caliber Vickers gun fixed in the starboard wing outside the propeller disc. A flexible Lewis gun is mounted in the after cockpit.

The performance figures of the Fairey light bomber are still on the war-office

secrets' list. It is a cinch, however, that she is way ahead of her big sister. She has just as much power, is a smaller ship and carries a smaller load. All we know is that after witnessing her trials, observers say that she has the speed, maneuverability and sensitivity of a pursuit plane.



The Battle Jr. "Raider."



## MODEL MATTERS

(Continued from page 61)

structed from kits. But in the future, original and interesting designs can be expected. Typical of such originality was the scale model of the Martin bomber, powered with two Elf engines. Unfortunately, this model is still in the experimental stage and no outstanding flights were turned in.

The contest was a success in every respect. This gas model contest will be an annual event in Hawaii. The gas-model craze is spreading rapidly and gas models have become well-established in the islands.

### Chicago Gas Results

The Gas Model Aeronauts of Chicago held a club contest, October 3rd, at 159th and Kidyie Avenue, in Chicago. Rules were 30-second motor run, total duration of three flights, and no restrictions on type of model. It was the first timer contest of the GMAC and ran off nicely.

PRIZE		
1. Melvin Yates	5:45.3	Forster Motor
2. Robert Forster	3:18.5	Silver Trophy
3. H. Bodinet	3:16.5	Kit
4. P. Bodinet	3:10.4	Kit
5. Miles Stone	3:06.5	
6. L. Klesman	2:44.3	
7. E. Koniffs	2:39.2	

### Quaker City Gas Club

The Quaker City Gas Model Airplane Club of Philadelphia has been particularly successful in club organization and contest procedure. Member William P. Beck has sent us the following information which is well worth passing on to other modelers interested in club operation.

The club holds a regular meeting the last Friday of every month at the Germantown Y. M. C. A. Contests are held the second Saturday of every month regardless of the weather. Only one contest has had to be called off because of impossible weather. Every one is invited to attend club meetings. This same invitation holds true for contests as well. Entry fee for contests is \$.50. The entry fees are distributed as prizes—the first three place winners dividing the "pot." Entries in these monthly contests average about twenty-five.

The total membership of the QCGMAC is 100—made up of small individual groups in different sections of the city. A novel plan is to allow each group to conduct a monthly meet. In this way practically every club member will become qualified to officiate at a contest, and there will be a sufficient number of trained men to help conduct the 2nd annual invitation meet to be held in Philadelphia next September. This is only a part of the preparation

already underway to make the 1938 meet even better than the meet of last year—which every one agrees struck a high point in efficient contest sponsorship.

Philadelphia newspapers have cooperated in boosting the club. Club officials make it a point to keep them posted on their model program. And they, in turn, publish photos and stories that help increase club membership and contest attendance. Typical of the progressive attitude of the club is that Mayor Wilson of Philadelphia was honorary sponsor of last year's invitation meet. He gave the contest official prestige and added materially to its smooth operation.

The club owns and operates a trailer for the convenience of club members. The trailer will call for the contestants' models, carry them to the airport, and back after the contest. This is probably the only trailer service of its kind—a novel feature for stimulating contest participation.

Any one interested in learning more about the technique of the club is invited to write William P. Beck, 209 Righter Street, Philadelphia, Pennsylvania.

### Centinella, California, Club

The five young model builders on the photo represent two thirds of the active members of the Centinella Model Aircraft Club. The photo was snapped immediately after a contest in which they beat two other model clubs—in a tri-club contest.

Henry Stiglmeir was high-point scorer of the meet. He won the stick model contest with a flight of 28 minutes. Following is a description of his stick entry: span—38"; chord—4½"; airfoil—R. A. F. 32; parasol wing with 4½" dihedral; 16" propeller with slight downthrust and no rightthrust; equipped with rubber tensioner and flies on 20 strands of ⅛" flat rubber.

The model has a fast climb and excellent soaring ability. When properly adjusted, the model makes flights of 2½ minutes minimum. It has been lost twice at 30 minutes and 22 minutes. Stiglmeir has recovered the model both times by using a note attached to the model which has the following message: "This contest model airplane is the result of years of experimenting in spare time. Often these planes fly so high they disappear in the clouds and are not returned. I value this plane very much and would appreciate being notified if it's found."

Henry has used this type of note on all his models. It has been responsible for the return of practically all his "lost" models.

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Let Fleischmann's Yeast help by removing these impurities the natural way. Millions of tiny, active, living yeast plants will help keep poisons from the blood and help to heal your broken-out skin. Many people get amazing results in 30 days or less. Neglect may ruin your skin for life. So start eating Fleischmann's Yeast at once. Buy some tomorrow!

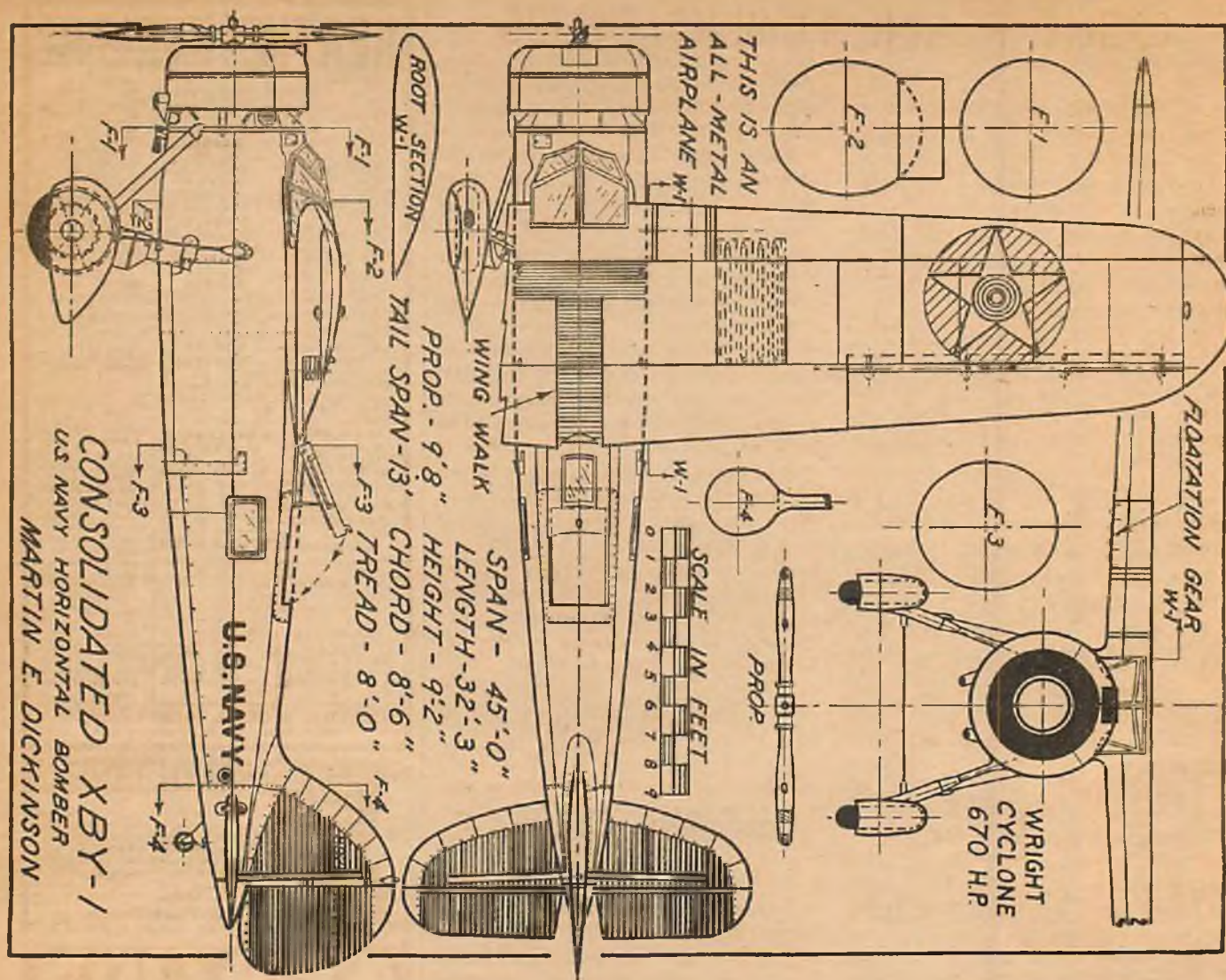
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W.  
M.  
WOOD

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## California Interclub Contest

A group of ace rubber modelers got together for an interclub contest last November 14th at the Los Angeles Municipal Airport. Henry Stiglmeir, one of the West Coast's outstanding modelers, captured individual honors with a high score of 250 points. Three clubs participated: Centinella, Evergreen and Santa Ana. The new weight rules were used, but did not hamper the flights as the following tabulation reveals:

### Stick

- |                                 |                      |
|---------------------------------|----------------------|
| 1. Tom Engleman (Santa Ana)     | 28:00                |
| 2. Henry Stiglmeir (Centinella) | (out of sight) 22:00 |
| 3. Lawrence Dresser (Santa Ana) | 4:10                 |

### Scale

- |                                 |                       |
|---------------------------------|-----------------------|
| 1. Andrew Petersen (Evergreen)  | (30" Renard R31) 2:48 |
| 2. Henry Stiglmeir (Centinella) | (out of sight) 2:10   |
| 3. Tom Engleman (Santa Ana)     | 1:25                  |

### Cabin Fuselage

- |                                 |                      |
|---------------------------------|----------------------|
| 1. Henry Stiglmeir (Centinella) | (out of sight) 36:00 |
| 2. Harry Johnson (Centinella)   | (out of sight) 9:35  |
| 3. Earl Wing (Santa Ana)        | (out of sight) 9:30  |

Centinella captured team scoring honors and a trophy by winning 395 points. Santa Ana was second with 250

points, and Evergreen gained 110 points. Several of the models which flew out of sight were recovered over 9 miles from the airport.

## Model Academy

At a special meeting of the Academy of Model Aeronautics held recently at the National Aeronautic Association's headquarters in Washington, D. C., members of the Academy nominated the officers to carry out the program for the coming year. Subsequent voting by all members of the Academy confirmed the choice of the nominating committee.

Following are the new officers: President—Al Lewis; secretary—Ed Roberts; chairman gas-plane section—Charles H. Grant; chairman rubber-power section—Carl Goldberg; chairman scale-model section—Paul Garber; chairman National Meet Committee—Howard M. Jellison; Chairman National Conference Committee—H. T. Sommers.

Academy members were sorry to learn of the retirement of Willis C. Brown, first president of the AMA. Largely through his work the Academy weathered the first hectic years and is now firmly established to carry out its

program. The new president is well qualified to carry out the work started by Brown.

Al Lewis is a modeler from Boston who is completely submerged in modeling interests. All his energies are devoted to increasing model interest. The formula which he used to build up modeling interest in New England should be mighty successful when applied to the nation-wide program of the Academy.

It is with considerable pride that we were able to present the new AMA president to the readers of this department. In the opening page of the model department Lewis sets forth the aims and ideals of the Academy. Be sure to read his "guest editorial" in this issue.

## Roy Marquardt's Latest

51,000 miles to a gallon of gas is one way of expressing the efficiency of the gas model—Riser Rider—built by Roy Marquardt, of Burlington, Iowa. This model won the 1937 Mississippi Valley gas model contest. It flew out of sight over St. Louis after crossing the Mississippi River. Later it was found about

(Turn to page 94)



# LIGHT PLANE FLYING CLUBS

(Continued from page 21)

least. After all, aircraft designers are limited to certain tried-and-true mathematical formulas. They are given a job to produce a ship that will lift a certain weight and carry it through the air with a certain amount of speed over a certain distance. It must be manufactured at a certain price and at the same time have an outward appearance that clicks with the present-day idea of what a plane should look like.

The new Aeronca has wheel control. Davis tells me that those who are getting their initial training on a wheel-controlled ship seem to learn the rudiments of flight much quicker than those who first learn to fly with a stick. This may be a matter of argument, of course. But to my mind, the sooner we get away from the goggle-and-helmet and the old joy-stick background, the sooner we shall make the light plane more popular.

With the Continental motor carefully and skillfully coveled and a rakish, sloping windshield to add to the dash of line, the Aeronca presents a pleasing appearance. The cabin is completely upholstered and finished in every detail. No young lady, no matter how fastidious she may be, could turn up her nose at the comfort offered. The oval instrument panel really has a touch of luxury about it. You'll love the feel of the new burnished aluminum control wheels.

I, for one, would like to pack an Aeronca with a typewriter, a camera, a fishing rod or two and the ever-present golf bag next June and hie me off for about two months. I know a few swell spots in Maine, a couple of airports I'd like to visit and one or two golf courses that have never been scarred by my divots. I'm sure I could turn out some swell stuff, much of it written en route—while I turned the wheel over to the better and much prettier half between stops. I'll bet I could write a story about a guy running into an air mystery with a light plane that would — Oh, well, what's the use!

Just a dreamer, just a dreamer.

## THIS "SNUFFY" BUSINESS

Not since "Mister Mulligan" dropped on the tarmac have we had such a demand for details on a ship as we have suffered over this "Snuffy" business. You remember that little 16-foot wing span biplane we showed in our December issue? It was built for Winthrop Gardner, Jr., by the firm of Greenmeier, Melberg and Ward of Floyd Bennett Field.

We're taking this opportunity to end all this "Snuffy" business. Hundreds of you have written in asking for the

plans, the price and the general information on the ship—none of which is available. Yes, we know it's a beautiful little job and all that. But as far as we know, you can't buy it, nor will the manufacturers give out free blue prints on it, and who can blame them?

Please get this straight. Little "Snuffy" was built under contract for a private owner, and we do not know whether the company has the right to build or sell another. If you are interested, you might write to them, in care of Bennett Field, and ask them. But we'll bet you all the tea in China it will cost you more than you would pay for a few Cubs or Aeroncas. Of course, it's a swell job. It had to be, for it cost a flock of money. You can't expect the manufacturers to pass out free blue prints on it. Blue prints cost money and those men probably spent hundreds in the designing of "Snuffy" before they got a cent in return. They would be fools to give away the details of their designing efforts to every one who felt like asking for them.

On the other hand, if you are really interested and ready to lay out a good sum of money, I am sure Greenmeier, Melberg and Ward of Bennett Field would be glad to talk with you.

But here's a ray of hope for many others who have been interested in the famous Knight Twister. You know the Payne Aircraft Co., of Cicero, Illinois, has turned out another of the noted Twister models. Well, we learn that you can buy a three-view drawing and two photographs of the ship for fifty cents. The address is 1231 South 52nd Avenue, Cicero, Illinois.

Three-view plans for the Ryan S-C, Menasco or Warner powered, are obtainable by writing the Ryan Aeronautical Company, Lindbergh Field, San Diego, California.

## LOG BOOK NOTES

We hope you have noticed that the former Taylor Aircraft Co. has changed its name. The manufacturers of the famous Cub will now be known as the Piper Aircraft Co., but the factory is still at Lock Haven, Pennsylvania. The firm is now named after W. T. Piper, who for ten years has been the Secretary-Treasurer of the company.

Few realize the extent air-mindedness reaches to-day. It is now on the records that more than half of the 230 members of the Piper Aircraft Co. are licensed pilots. They ought to be turning out a good plane.

For those who have always had a dread of making landings, the new  
(Turn to page 95)

**HEATHE**

1" BALSA  
1/16 sq. 100, 5c  
1/16 x 1/8 35 for 5c  
1/16x3/16  
.....18, 5c  
1/16x1/4 15 for 5c  
1/10x1/4 5 for 5c  
3/32 sq. 30, 5c  
3/32 x 1/16 12 for 5c  
3/16 x 1/10 12 for 5c  
3/16 x 1/8 10 for 5c  
3/16 sq. 8, 5c  
.....12, 5c  
1/4 x 1/4 6 for 5c  
1/4 x 1/8 6 for 5c  
1/4 x 1/16 6 for 5c

18" SHEETS  
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3/4 ft. ....7c  
3/16 or 1/4 ft. 10c  
WIRE  
6-8 10-12 14  
.....10-15c  
WOOD VENEER  
PAPER  
20x30, 1" for 10c  
CAMEL'S HAIR  
BRUSHES  
Small 3c, 1 1/2 5c  
Extra Large, .8c  
PURSUIT  
MACH. GUNS  
3/4", 1 1/2" or 1 3/4"  
each 5c  
BOMBS  
3/4" 8c, 1 1/2" 7c  
1 3/4" 12c  
MACHINE-CUT  
BALSA PROPS  
2" 4c, 6" 5c  
4" 6c, 6" 7c  
10" 8c, 12" 10c

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brown, olive drab,  
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1 oz. .06 2 oz. .10  
3 oz. .19 1 pt. .65  
COLORLESS  
CEMENT  
1 oz. .05 2 oz. .08  
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## MODEL MATTERS

(Continued from page 92)

thirty miles away. About  $4\frac{1}{2}$  hours and 100 miles in the air, all on  $\frac{1}{4}$  ounce of gas. Thus by some calculations we arrive at the startling fuel economy mentioned previously.

### Junior Aviation League

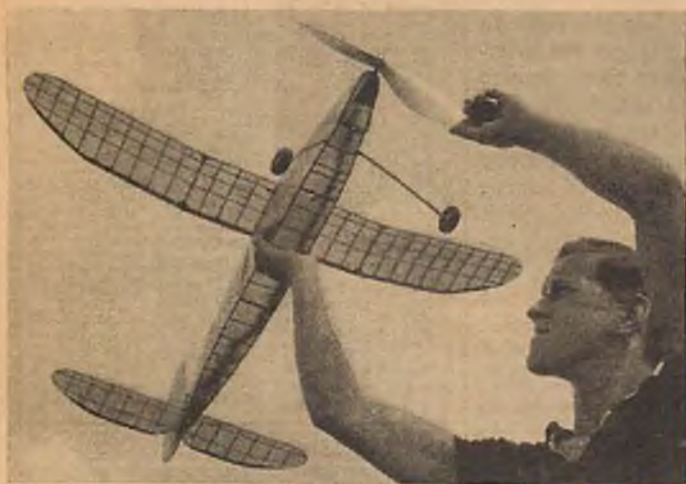
Junior Aviation League, Boston, Massachusetts.—Sidney Wallerstein, of

Roxbury, Massachusetts, is the fifth club member to win the rating of "ace." Sid has been competing in club contests for the past four years, although he joined the organization back in 1929. He is especially skilled in scale model construction. In the League's last scale model contest he won first with a model of the Douglas Mainliner.

Sid does not confine his work to scale models. He has turned in many outstanding contest performances. Quali-

fications for the "ace" rating demand successful competition in every branch of model building, and Sid passed them all with flying colors. At present he is grooming his models with an eye toward Detroit, where the 1938 National meet is likely to be held. At present he is high in the League's point system rating.

Wallerstein was graduated from Roxbury High School last June. Since then he has spent all his leisure time working on models.



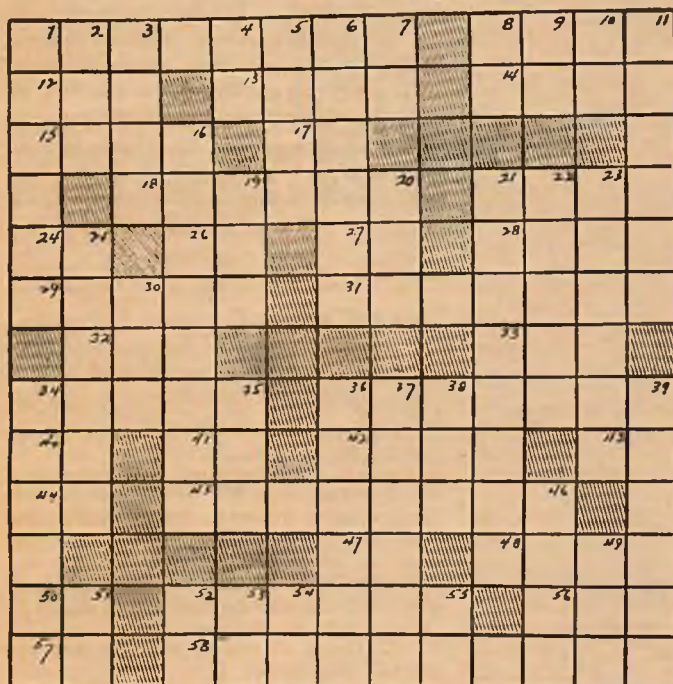
## 54 MINUTES!

All model builders will be interested to know that the Burd Model Airplane Co. has made available exact replica kits of Dick Korda's outstanding, world-record, cabin fuselage model.

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Air Trails brings this information to the attention of model builders in appreciation of their support to the program of the world's foremost trophy-winning models. It is felt in doing so that modelers everywhere will welcome the opportunity of duplicating this sensational design that appeared in the February Air Trails.

### CROSS WINDS



#### ACROSS

- 1—Difference in angles of attack between upper and lower wings of a biplane
- 8—Air conqueror of North and South Poles.
- 12—One of Howard's racing planes
- 13—Feathered flier
- 14—Period of time
- 15—Snaky fishes
- 17—Perform
- 18—Hereditary
- 21—One of two equal parts
- 24—Printer's measure of line length
- 26—Prefix meaning two
- 27—Negative
- 28—Revise for publication
- 29—Defame unjustly

- 31—Flies in ascending or descending circles.
- 32—Lifting force in lighter-than-air craft
- 33—Appropriate
- 34—Corner
- 36—Establishment for refining metal ores by melting
- 40—Exist
- 41—Neuter pronoun
- 42—Leopard

- 43—Famous make of British planes, as known by initials
- 44—Present
- 45—American light plane made by Rose
- 47—The smallest State, initials
- 48—Suppose
- 50—For example, abbreviation
- 52—Make of C-34 light plane
- 56—Kind of grain
- 57—Therefore
- 58—Kinds of hunting falcons; also, British sport planes made by Miles

#### DOWN

- 1—Type of engine in which fuel is ignited by heat of air compression
- 2—Add to laboriously
- 3—Gas chamber within dirigible balloon
- 4—Sixteen ounces, abbreviated
- 5—Military assistant
- 6—Suffers audibly
- 7—Publication director, abbreviated
- 8—Near
- 9—You, old style

### Answers for February

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

- 10—Chemical symbol for radium
- 11—Deviates side-ward from route of flight due to cross wind
- 16—Movement of airplane along lateral axis resulting in loss of altitude
- 19—Nothing
- 20—Cut off
- 21—Announced
- 22—Make suitable
- 23—Sang merrily
- 25—Inventor of the Flying Flea light plane
- 30—Air slang for balloon gas container
- 34—Slackens
- 35—Seventh Greek letter, corresponding to E
- 36—Scanty
- 37—Manufacturing
- 38—Before
- 39—Words ending with a similar sound
- 46—Kind of sea bird
- 49—Organ of vision
- 51—Proceed
- 52—Initials of Air Adventurers' famous Wing Commander
- 53—Electrical engineer, abbreviated
- 54—Senior, abbreviated
- 55—One hundred square meters



## LIGHT PLANES

(Continued from page 93)

Gwinn "Aircar" should offer welcome relief. We have been looking over the landing technique incorporated into this new machine. From what we can understand from Harry Bruno, the Gwinn representative in New York City, the "Aircar" is not landed in the ordinary sense of the word. It is "flown in." A general description explains that the airport is approached in level flight at low speed and low altitude with the flaps down. At the edge of the airport the engine is idled and all that is necessary for the pilot to do is to maintain the ship in a level lateral position, for the "Aircar" takes its own glide and strikes the ground on a level keel. The position of the elevator in this maneuver merely determines the flight-path angle. Full forward elevator produces a flight-path of 8 degrees, 40 minutes at 56 m.p.h., and full-up elevator produces a flight-path of 11 degrees at 49 m.p.h. The full-up elevator landing can be accomplished in 550 feet from a 50-foot altitude to the complete stop.

How long can one stay away from an airplane, and still retain most of his actual flight skill?

This question has been brought up time and time again, and you will notice that your ticket demands a certain amount of regular flying—when you come to renew it. I have talked to several light plane pilots and most of them agree that when weather holds them up for any length of time—or the means to purchase gas—a month is about as long as they care to stay away from the stick.

"It isn't that you lose any skill of muscular reaction," one explained to me. "I notice that after being away from flying for a couple of weeks, I make a series of pretty good landings, and I seem to do simple maneuvers fairly well. But that is because I am alert and realize that I have been away from it, and am taking no chances. But when I really analyze my flying, I know I have lost some of it. I may not bump her badly the first time, but on the second or third I usually do something silly."

"What do you do after a bad bump?" I asked.

"Well, first I taxi away and hide my



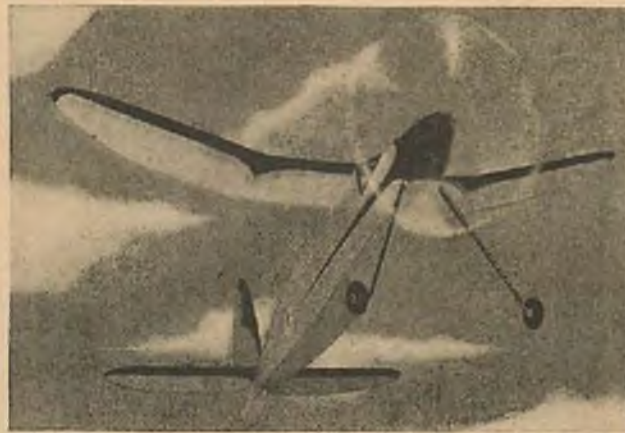
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DICK  
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general confusion," he said sheepishly. "Then I get out and make a careful examination of the undercarriage and skid and if I am certain nothing serious has happened, I take off again and go through the same landing—minus the bad bump, of course—about six times. That usually brings me back to my senses, and I seldom make the same mistake again—for a few months, anyhow."

"What has been the cause of most of your poor landings?" I probed.

"It's always the same reason. Not

sudden gusts or changing wind, which so many of us use as an excuse," he grinned. "We really get careless. We take our hand away from the throttle to fiddle with a tail-trimming gear, or we are messing about with a window latch, and there you are. A slight emergency arises and it is too late to find the throttle again to correct a sudden sinking motion. You have to take it, and hope."

In other words, you can't do more than one thing at a time—when you're bringing a light plane in.

## WINGED WORDS

*Descriptive captions for the pictures appearing on pages 22 and 23.*

1. Andy Stinis supervises the pumping in of the special smoke-making liquid. This fluid, an oil base with a secret chemical to hold the smoke together, flows by gravity into a motor-driven pump. The fluid is pumped into the manifold, where it is turned into smoke by the heat. One capital letter requires approximately a gallon of liquid.
2. At 12,000 feet Stinis feels for smooth air, as an up or down draft will break up the smoke. Finding the best altitude, he then depresses a lever—permitting the fluid to reach the manifold. The sign must be written backward in order that people on the ground may read it correctly. The lines are horizontal, not vertical.
3. Having made sure that clouds or the sun will not interfere with the reader's vision, he starts the first letter by heading directly at an object on the horizon. Other lines are to be made parallel. The straight line of a capital may be a mile long.
4. A finished F as the pilot sees it. Accurate judgment is necessary in turning the smoke on and off.
5. Completing the letter I, Stinis'

plane is viewed here from across the F previously finished. The smoke expands to approximately 50 feet in diameter after leaving the exhaust.

6. Starting the N. This letter here looks like a question mark due to the fact that it has been, as all skywriting is done, written backward.

7. Having finished a letter, Stinis shuts off the smoke and dives down to view his handiwork.

8. A sharp climbing turn makes the top of the letter E.

9. In making an E the plane must do a wing-over, then swoop around to finish the letter.

10. The ship is now in a vertical climbing bank on top of the letter E. Skillful handling of the ship is necessary, because at high altitudes it may easily fall into a spin.

11. A close-up of the skywriting plane. Going between 125 and 140 m.p.h. The exhaust is asbestos wrapped to hold the heat, for near-zero temperatures are encountered.

12. Here we have the completed word as seen over the ocean from 3000 feet above. This typical four-letter word is nearly four miles long.



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[illegible]

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