

AIR TRAILS

A V I A T I O N F O R E V E R Y B O D Y

DEC. '39

**SHOULD ARMY AND NAVY AIR FORCES COMBINE?
THE EYES OF WAR • NEW CAMOUFLAGE**

Six-Minute Class A Gas Model

DECEMBER

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FIFTEEN CENTS

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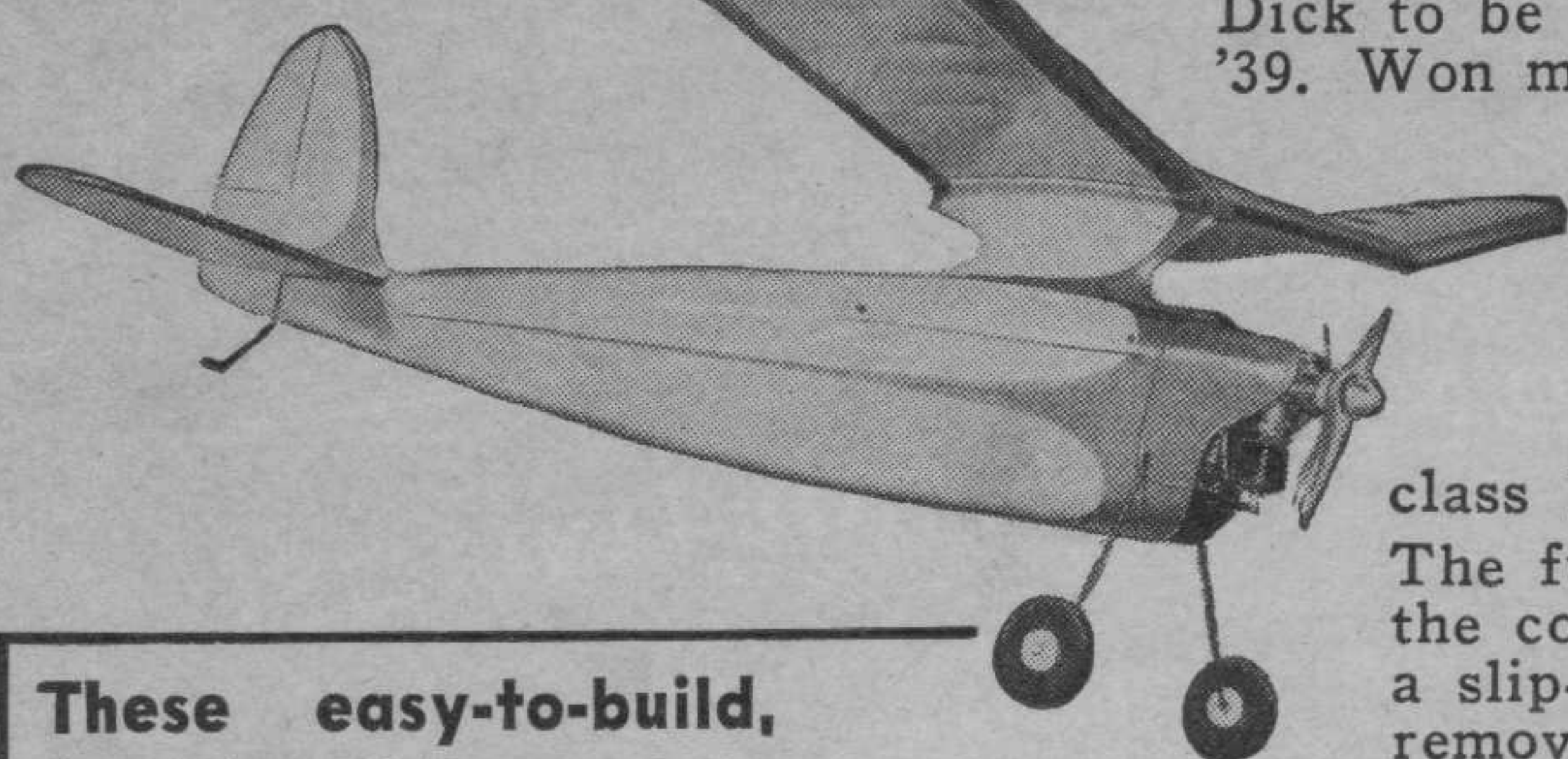
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AMERICA'S
NUMBER 1
MODEL
BUILDER

Now Ready—The Gas Model Everyone's Waiting For!

DICK KORDA'S "CHAMPION"



These easy-to-build,
complete kits contain

Full size well detailed drawing; Printed out ribs and parts; Plywood for fire wall; Cut to size wood strips; Colored bamboo tissue; Wood and tissue cements; Formed wire landing gear; Streamlined wheels; Celluloid, nuts, bolts and everything else needed except power unit.

This beautiful class B, red trimmed, yellow (or gray) gas model by Korda is modestly claimed by Dick to be his "luckiest" model so far. Winner in many contests, including the Detroit "Nationals" in '39. Won many first places under severe conditions. With the popularity this design is destined to have, no one can go wrong on it. The "Champ" has made a series of well-known flights, and since it has shown that it has "the stuff it takes" to win contests, we decided it should be manufactured without awaiting further developments, which began when he designed it in November, 1938.

The streamlined model has a span of 48" and a length of 32½". When powered with a ¼" bore or under, such as the Ohlsson "23," it will be a great contender in all class B contests.

The fuselage is planked with 1/16" balsa throughout, the cowling is removable for flight and the wing has a slip-off type cradle in the event of a crash. This removable feature makes it very convenient when transporting the model or repairing it.

What more need we say than it is designed, tested, and approved by America's No. 1 model airplane builder? Order the complete kit (except for power unit) GP-5005, only.....

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For Beginning Gas Modelers!**



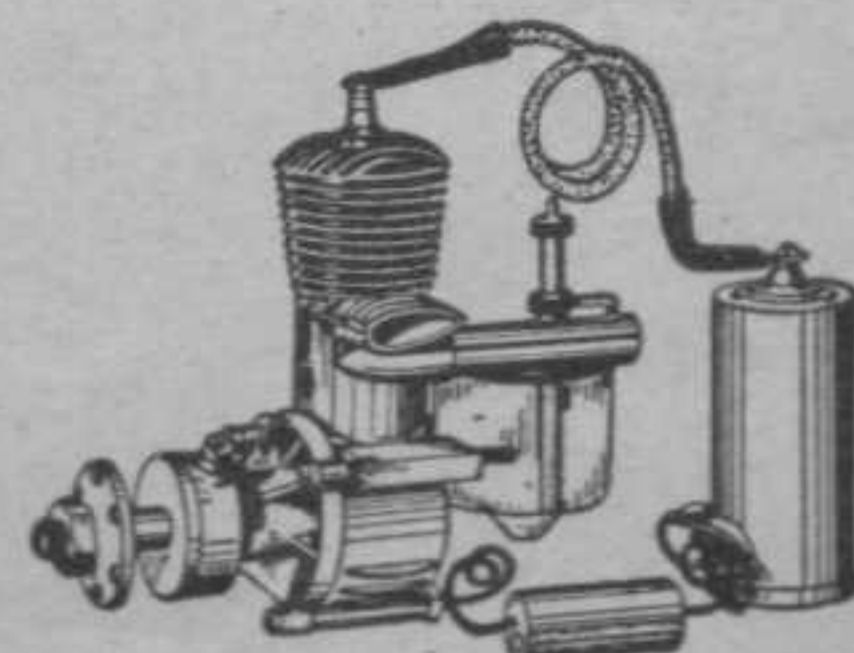
This beautiful, advanced type class "B" monoplane is colored yellow and trimmed in blue, 15½ oz. complete with a bare (covering removed) coil. When powered with an Ohlsson "23" engine, we believe it is one of the lightest gas models designed in its class. It has a span of 42½" and length of 30½". The design of the wing (under-cambered) gives it stability which, together with the highly streamlined fuselage and lifting tail, makes it an excellent contest model. With its beautiful and unusual tapered wing and its general appearance, we believe it makes one of the most beautiful free-lance commercial type gas models ever to make an appearance. Order complete kit GP-5007 (except power unit), only

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OHLSSON "23" MOTOR

Recommended for the three gas models shown here. It is the most popular type of small gas motor in use today. Develops 1/7 horse power and has a displacement of .23 cubic inches which comes within a B class. The motor complete with coil and condenser, factory tested, for only

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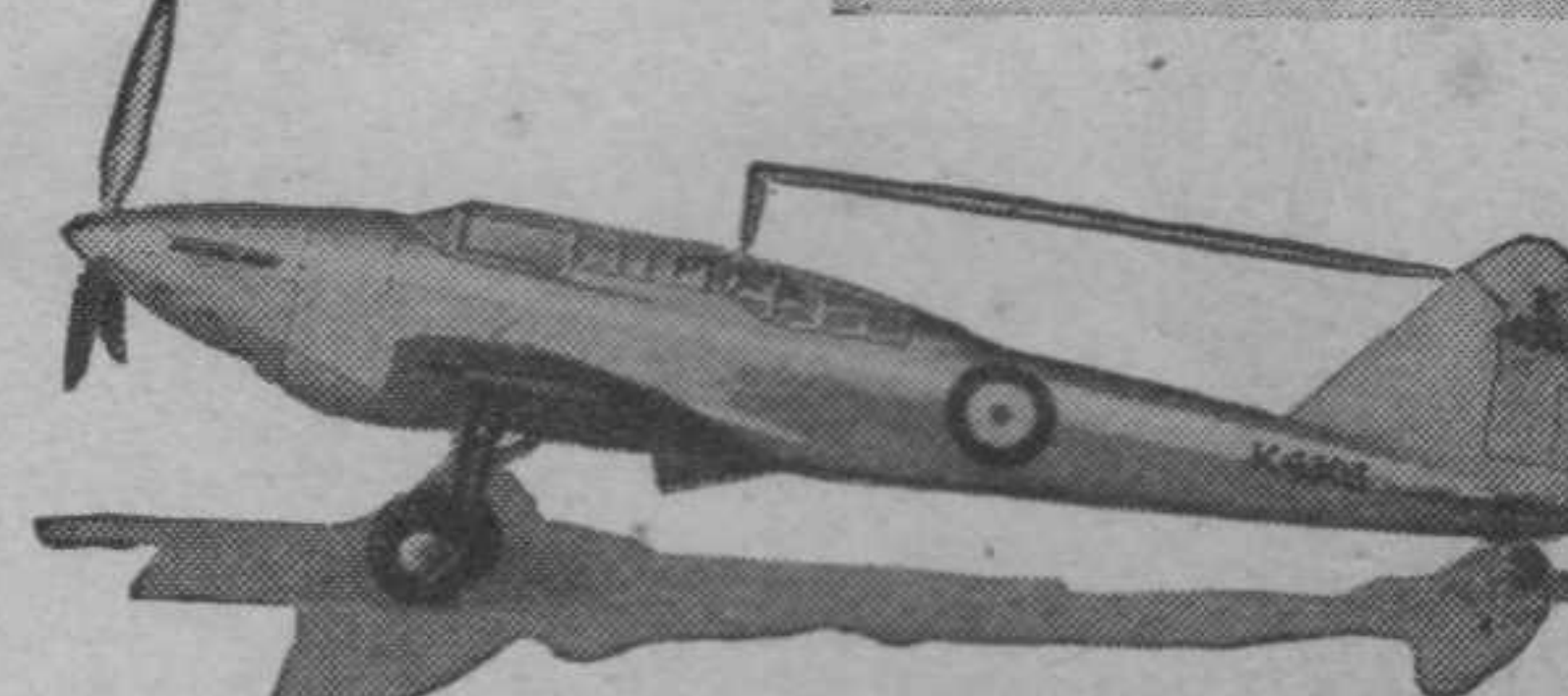
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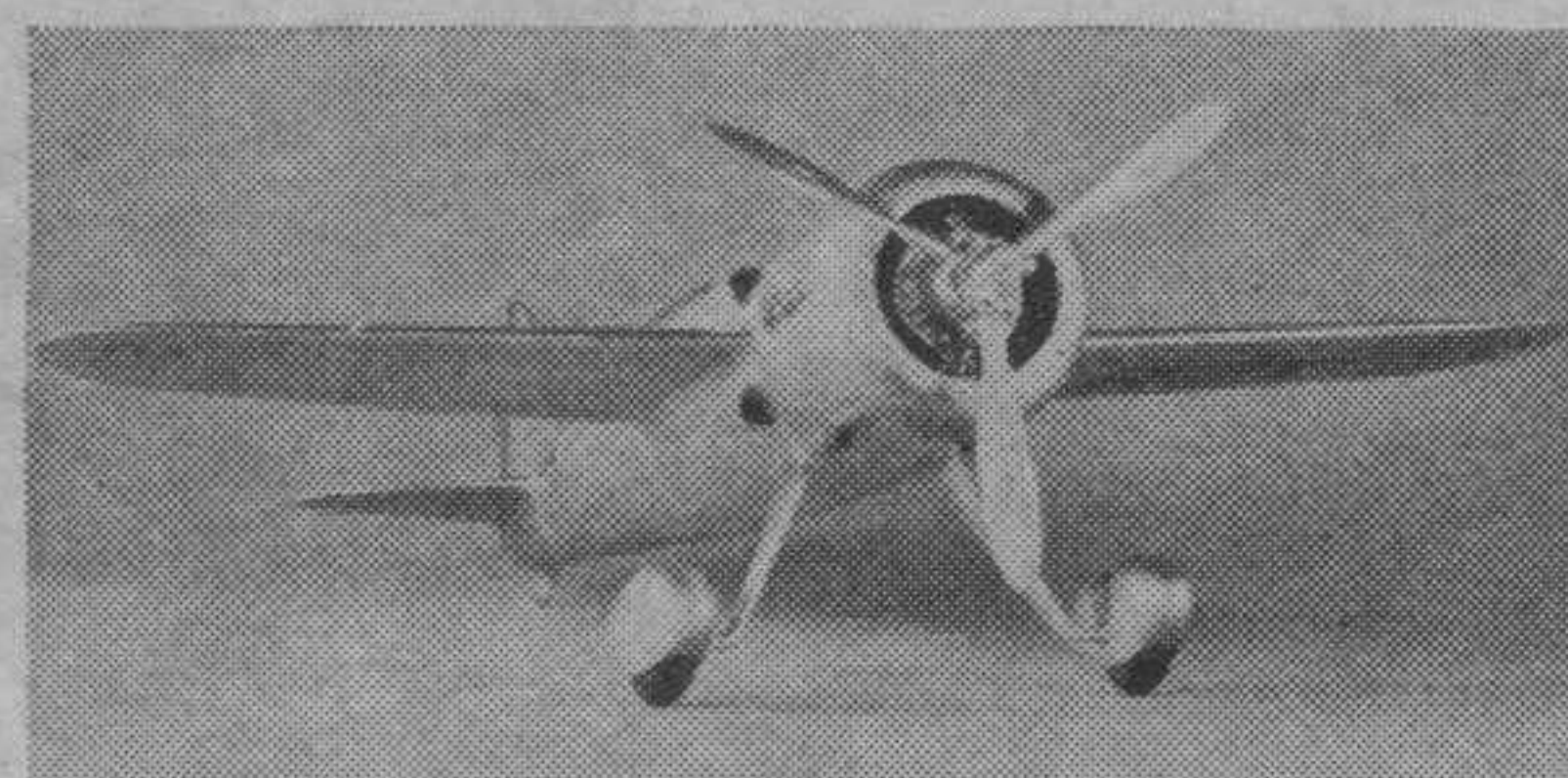


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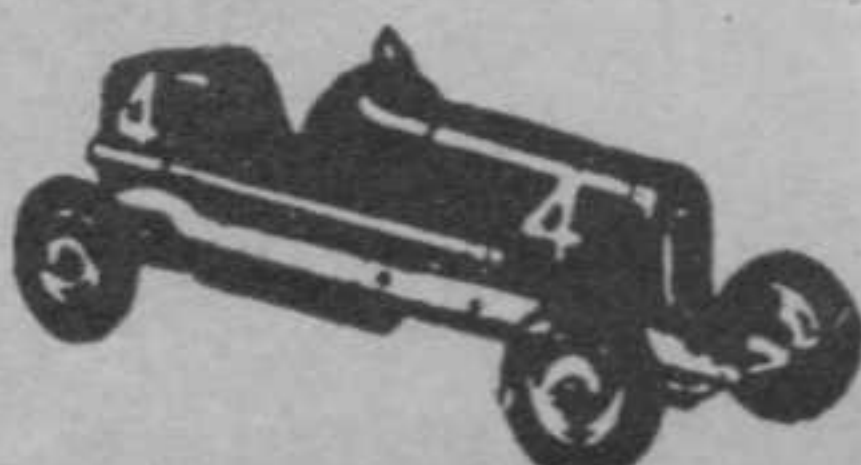
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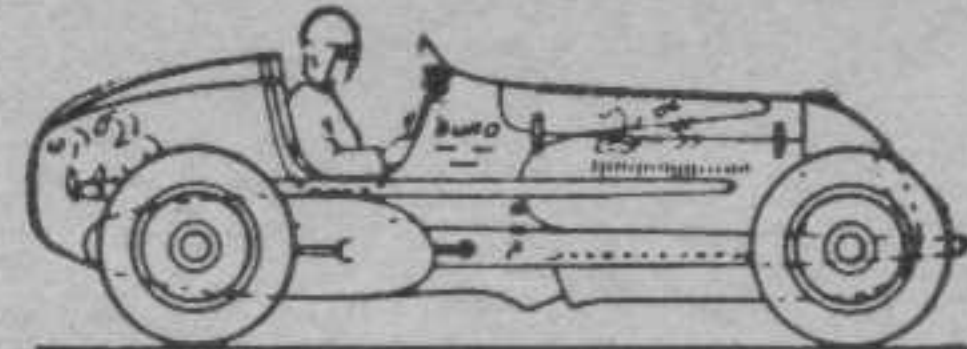


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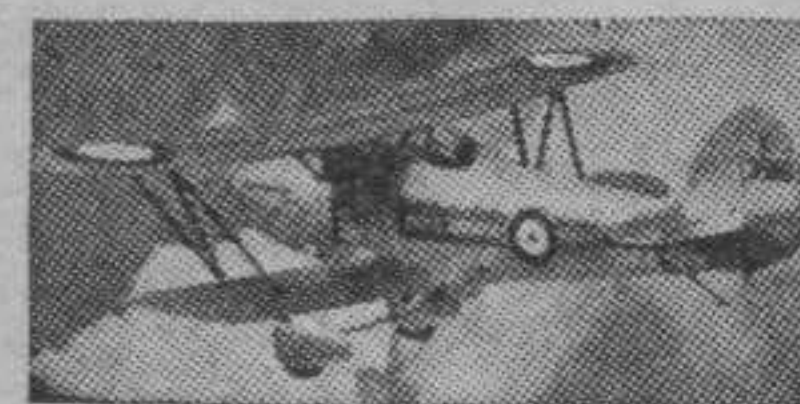
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RB-6 SP 40' wood turn. .10	RG-1 L&N 41' 50 ton .10
RB-7 T&P 40' wood auto .10	RG-2 NYC 41' 50 ton .10
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RH-4 Illinois Central RR .10	

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August 25, 1939

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DECEMBER, 1939

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Latest military cameras



Two air forces or one?



Record Class A gas model

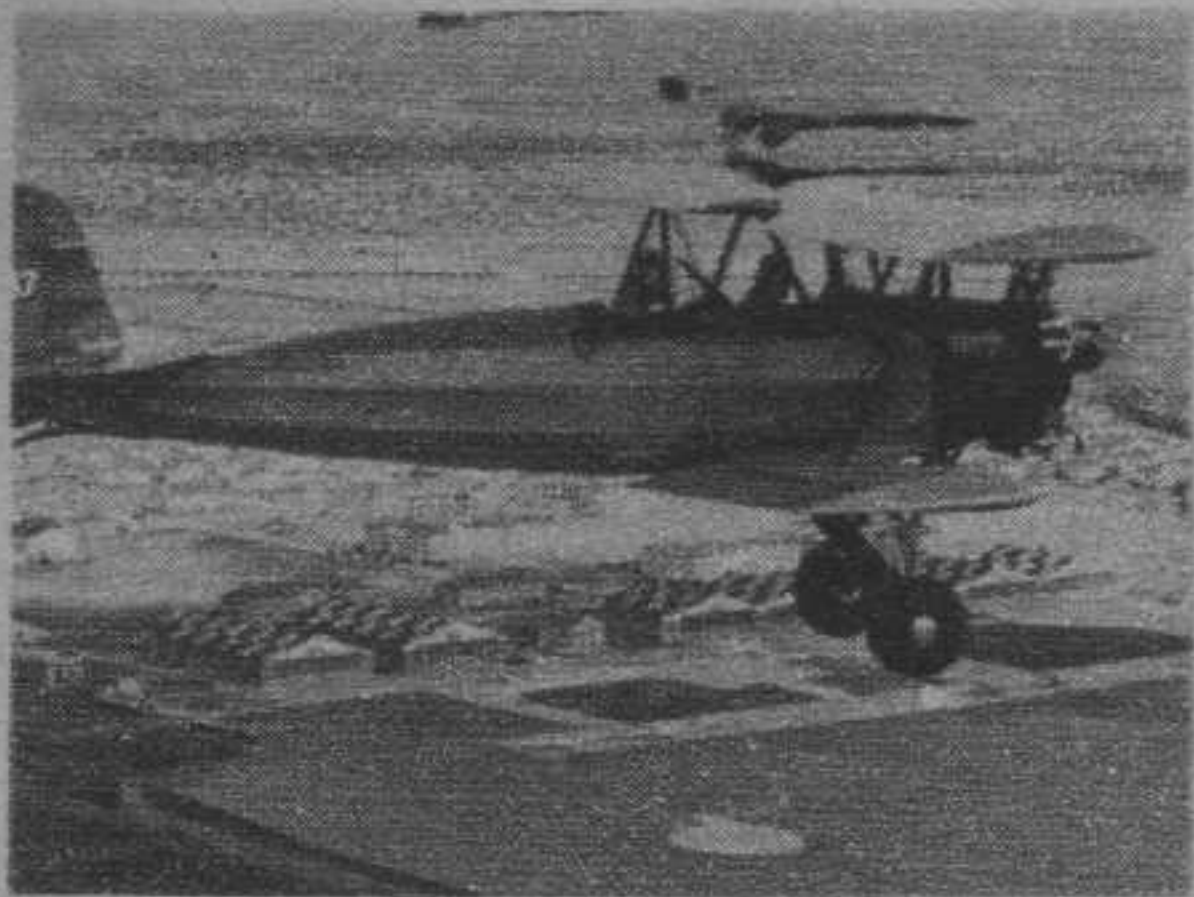
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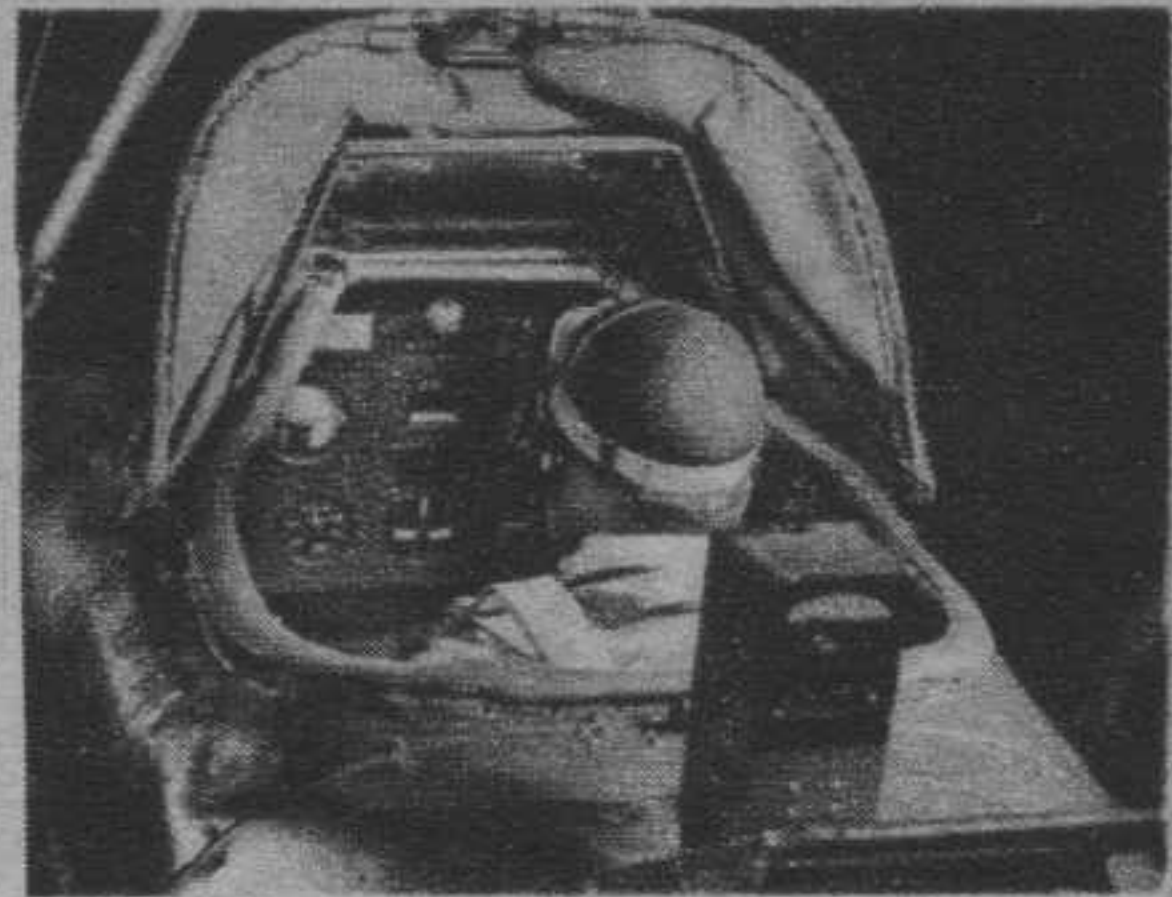
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and in the U. S. Army and Navy Air Services

300 Pages, 75 Illustrations, \$3.00



WRITTEN to help its users meet the government's requirements as established by the Civil Air Regulations, this book supplies in detail the flight training instructions needed by student pilots and also by pilots, already proficient, who wish to attain higher grades. In addition, it will be helpful to flying instructors and to pilots who wish to obtain that rating. It is also designed as a guide for pilots who wish to correct faults and attain greater skill in precision flying.

AIR PILOTING brings you the cream of what Mr. Simmons has learned in training hundreds of pilots during his twenty years of continuous experience as a flying instructor. Reading his book is like having this veteran instructor at your side to explain the things that puzzle you, to point out your mistakes and show you how to overcome them.

Mr. Simmons supplies a detailed system of instruction from first solo to instrument flying. He analyzes and explains all the flight test maneuvers required for the various pilot certificates and flying ratings. Complete dia-

grams illustrate every detail of each maneuver and make it clear and easily understood. He also covers fully radio range layout, methods of orientation, private flyer's use of radio, and gives much information on advanced flying techniques—including exhibition aerobatics.

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Civil Air Regulations. Selected air traffic rules which must be thoroughly mastered by student pilots preparing for government examinations.

Solo Pilot Flight Course. Procedure before and after solo. Factors to observe in primary 8's 1 and 2. Advantages of the base-line glide approach. Summary of flight test requirements.

Private Pilot Flight Course. Shallow, circular, steep eight. Triangulation spirals. The 180°, 360°, 1080° spirals; vital factors to keep in mind. Practicing stalls, with and without power. Primary and advanced spins. Procedure for the 720° vertical bank. Cross-wind take-offs and landings. Forward and slideslips; slipping turn.

Limited-Commercial Pilot Course. Requirement for higher degree of proficiency in same maneuvers as those in private pilot's flight test. Restrictions and privileges of the limited-commercial pilot rating.

Commercial Pilot Flight Course. Summary of maneuvers in flight test. Possible additions made by inspectors to usual flight test routine. Precision maneuvers recommended for developing highest skill in handling plane near ground, from predetermined exact alti-

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Instrument Flying and Rating. Maneuvers that must be performed, solely by instrument, in practical flight test. How radio skill must be demonstrated. Airplane. Link Trainer instruction methods. Flight Plan. Typical practice flight procedure.

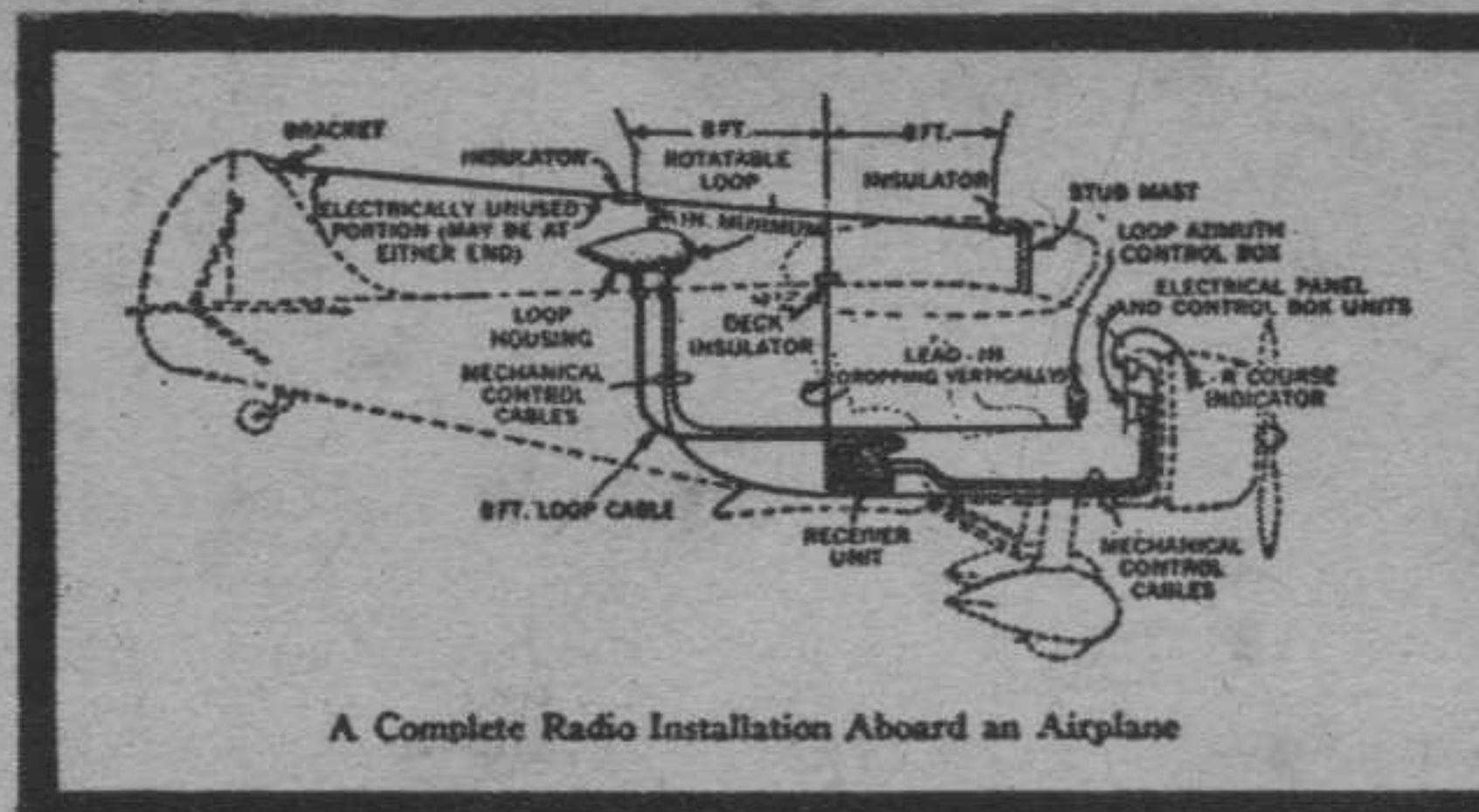
Flying Instructor Rating. Requirements for special competency rating. Latitude given examining inspector to assure himself of candidate's qualifications. Summary of flying school rules and sequence of training maneuvers for primary and advanced students with which prospective instructor is expected to be thoroughly familiar.

Meteorology. Condensed selection of definitions and explanations pertaining to meteorology within scope of examinations given for all ratings above solo pilot.

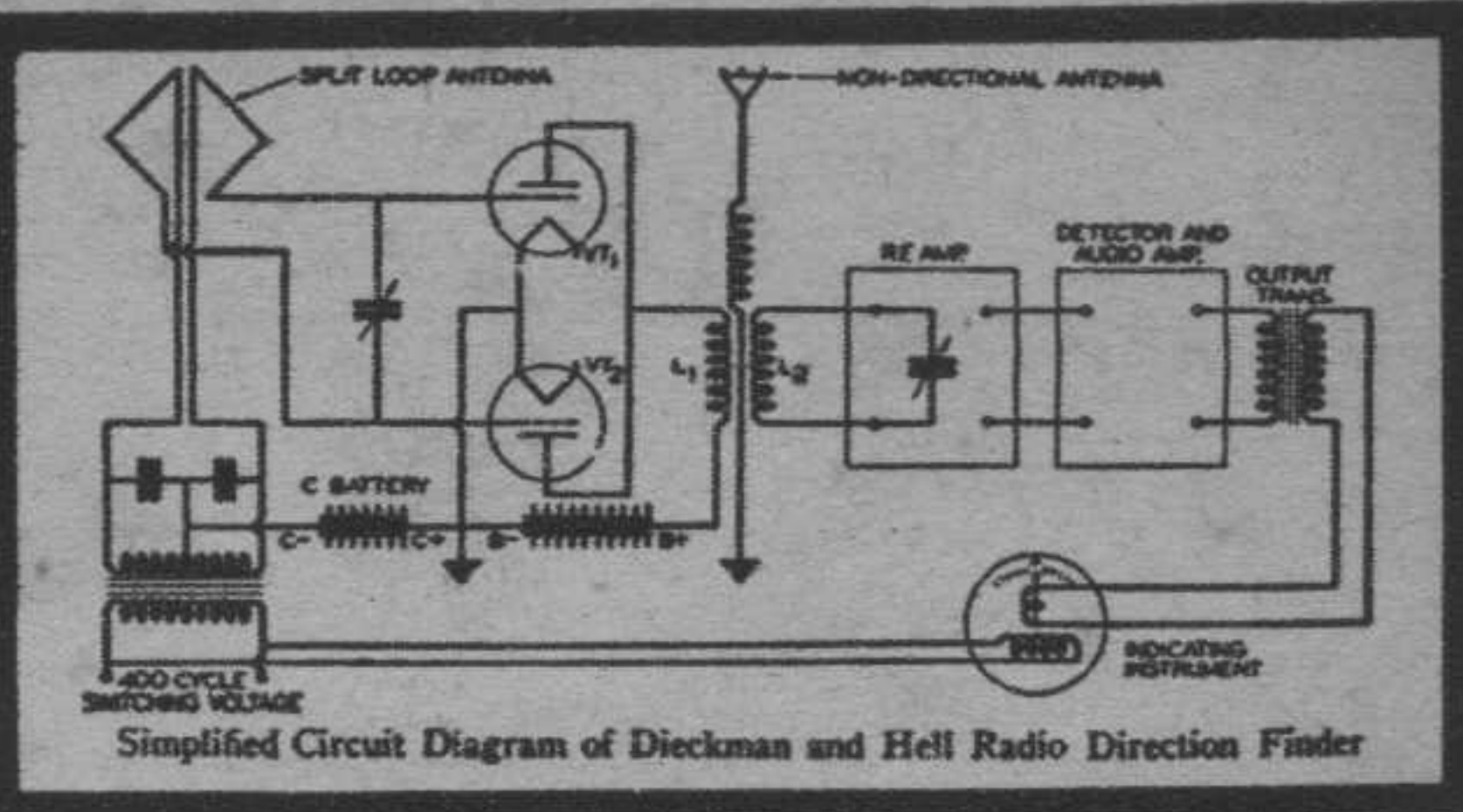
Miscellaneous. Handling plane having 3-wheel landing gear. Exhibition aerobatics at low altitude: Inverted figure 8. Cuban 8's Nos. 1, 2, 3.

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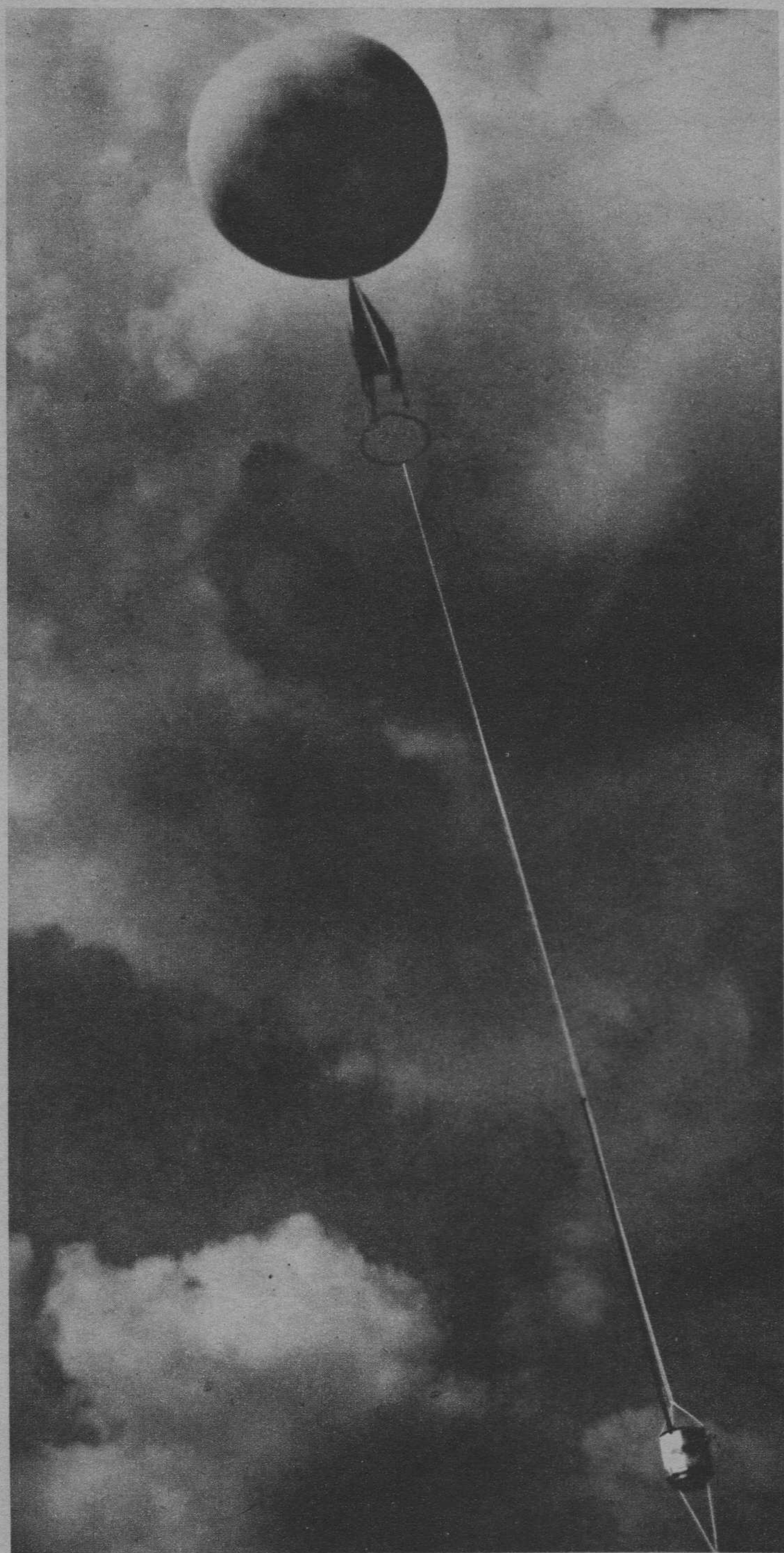
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WEATHER SERVICE and the PRIVATE FLIER

Radiometeorograph heads for stratosphere to get pressure, temperature, humidity readings. Parachute lowers the instruments after balloon breaks.



DURING the past thirteen years the demands for weather service for scheduled passenger and mail flights over the civil airways have forced rapid expansion of the weather organization, and the weather bureau has never quite caught up with these rapidly growing demands.

The weather reports and advices which are designed primarily for scheduled airways traffic are of course available to the private flier engaged in all types of unscheduled flying. But as this private air traffic increases in volume it is recognized that the present weather service does not always meet the pilot's needs. At times his objective carries him off the regular civil airways into localities where the present service is not set up to give him information on his direct route. He may want to take off between scheduled flights when weather advices are not immediately available, or he may want to take off from some small-town airport where weather news may not easily be obtained by telephone.

Eventually, the civil airways system will become so comprehensive that there will be an established airway and its associated weather service for almost every imaginable cross-country flight. Then, with minor modification, the weather bureau will serve the unscheduled private flier as well as it does the regular mail and passenger flights.

Essentially, what the pilot wants to know is whether he can take off, get through, and land safely. Usually it is not satisfactory for the meteorologist to answer that question. The forecast and data are available for him, but the pilot must be capable of interpreting that data.

In order to utilize the weather service to the greatest extent possible, the pilot must know its possibilities and its limitations. Weather-wise as most experienced pilots are, they often place incorrect interpretations on weather reports and advices. Sometimes they lose sight of the basic distinction between weather reports or observations and weather forecasts. Weather observations are matters of fact and can be one hundred per cent accurate. A forecast is a matter of expert opinion and is subject to the usual errors of human judgment which unfortunately sometimes creep into the calculations in every science and profession. These errors may arise from incomplete or inaccurate data, from incomplete knowledge of the scientific principles involved, or from just plain headache.

The weather bureau now has a widespread organization. With a few improvements which are now in prospect, we shall be able to render excellent weather service to the aviator and to every other occupation and profession. We have plans to meet the deficiencies now found here and there and when the private flier wants weather, and with an understanding by the pilot of the possibilities and limitations of a weather service, and his friendly co-operation, I believe we shall find that we have done something constructive about the weather.

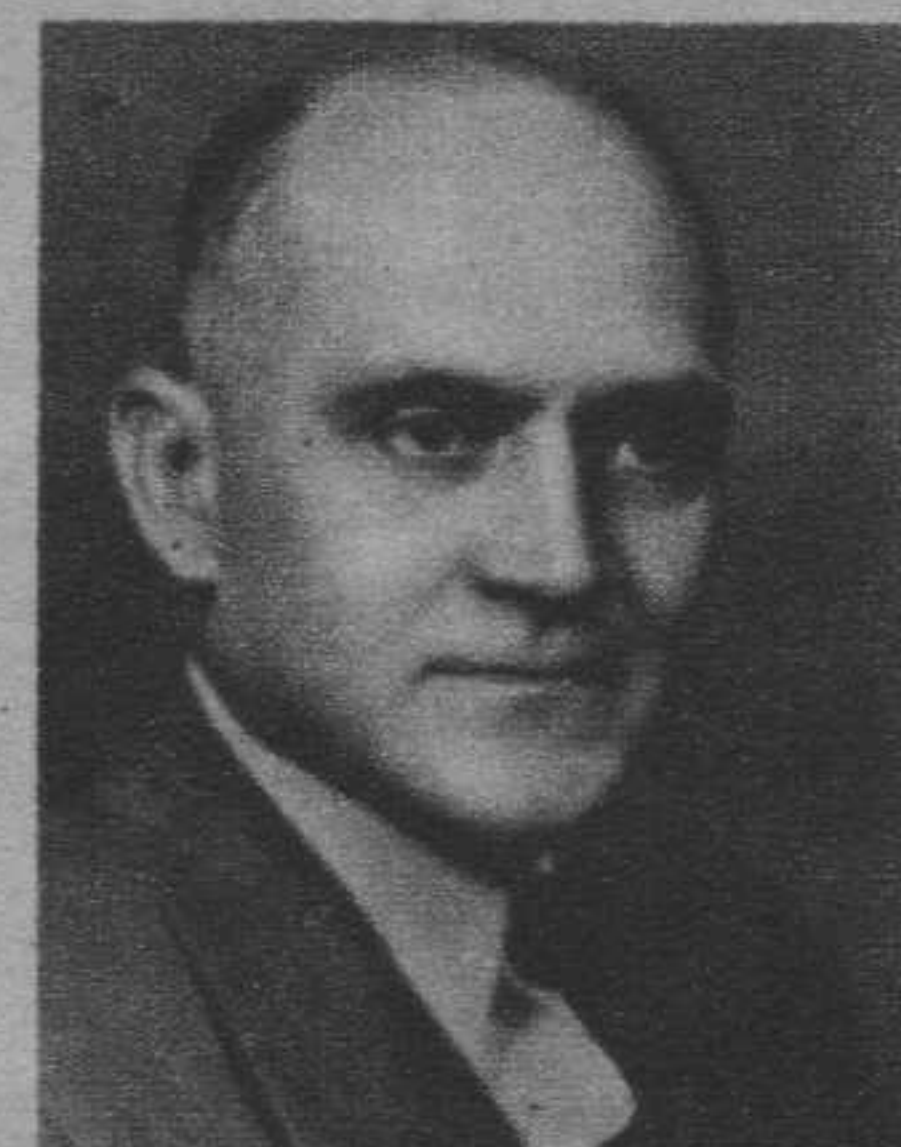
MEET COMMANDER REICHELDERFER

By William Herbert Randall

The chief of the weather bureau is a navy man from the very start. In February, 1918, he enrolled in the naval reserve for aviation duty. In May of the same year he was called for active duty under instruction at the naval aviation ground school, Massachusetts Institute of Technology at Cambridge. In August he was commissioned an ensign, U. S. N. R. F.

September, 1918, found him stationed at the naval air station at N. Sydney, Nova Scotia, as aërological officer for the antisubmarine flights. May and July, 1919, were spent aboard the U. S. S. *Shaumut*, and as aërological officer at Lisbon, Portugal, European terminal of the first (Turn to page 63)

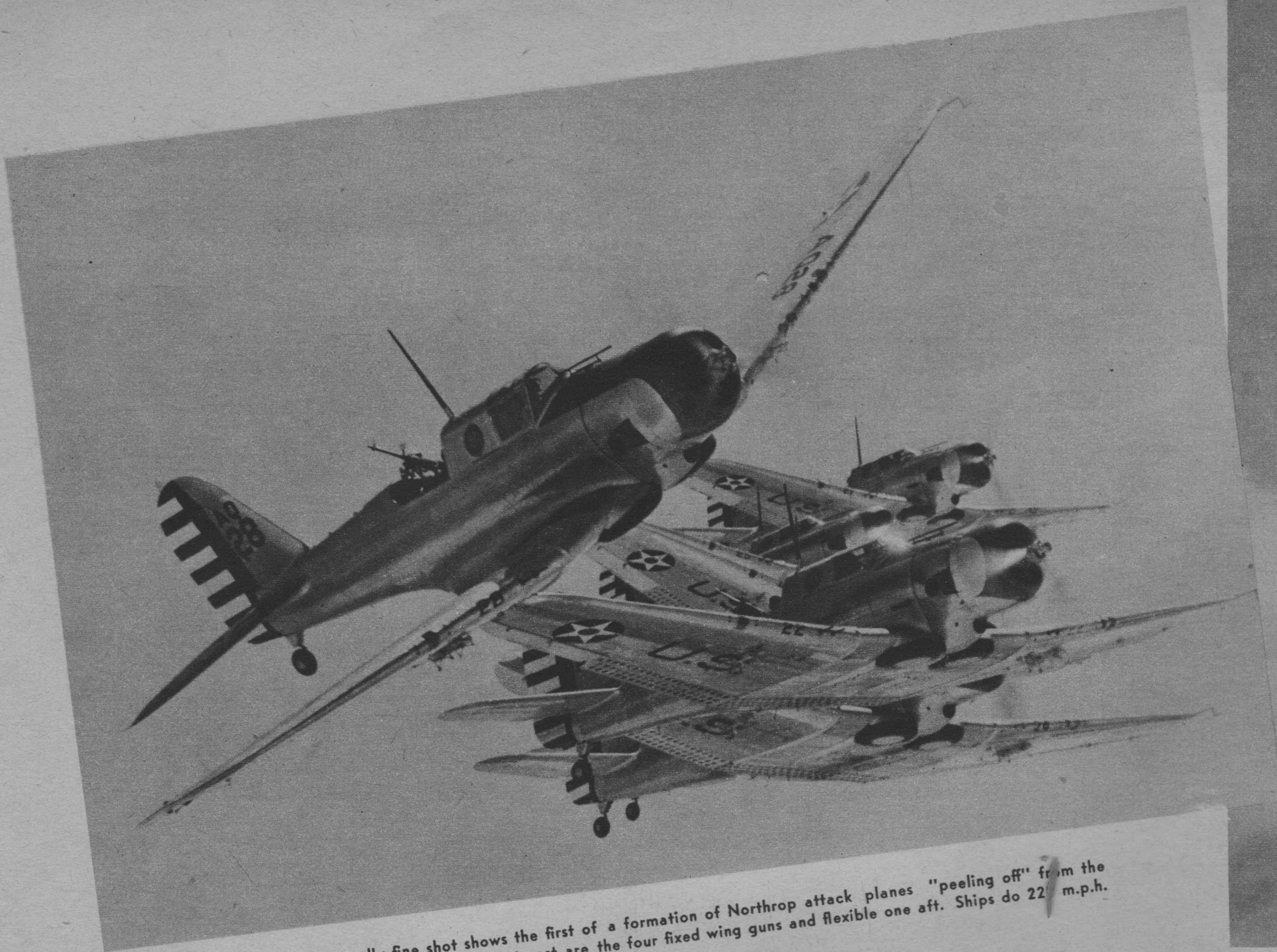
A GUEST EDITORIAL BY COMMANDER F. W. REICHELDERFER
Chief, U. S. Weather Bureau



THIS WINGED WORLD

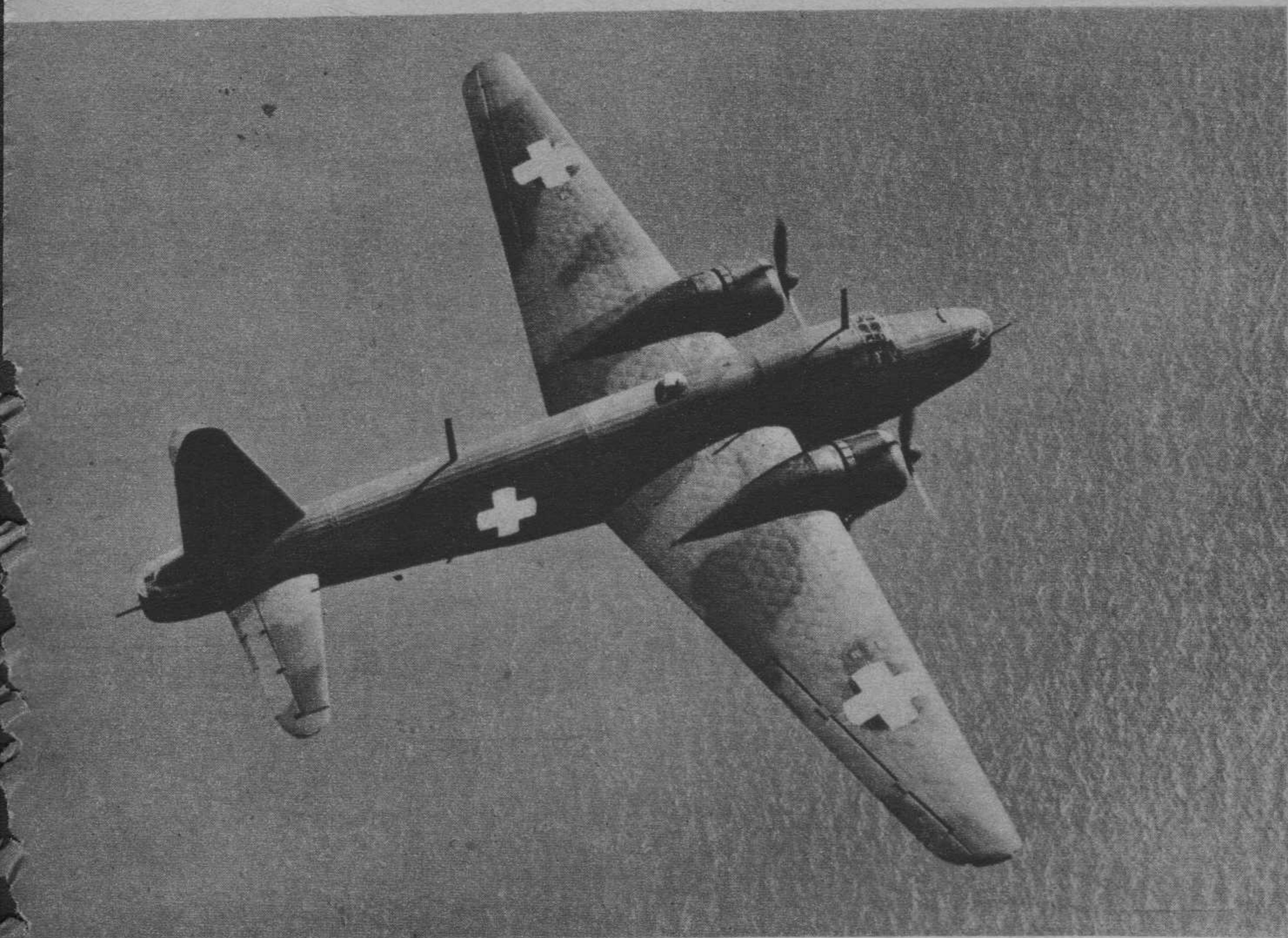


England banks on these! This giant Handley Page Hampden bomber, seen in a vertical bank across a sister ship's tail, is one of Britain's best war planes.

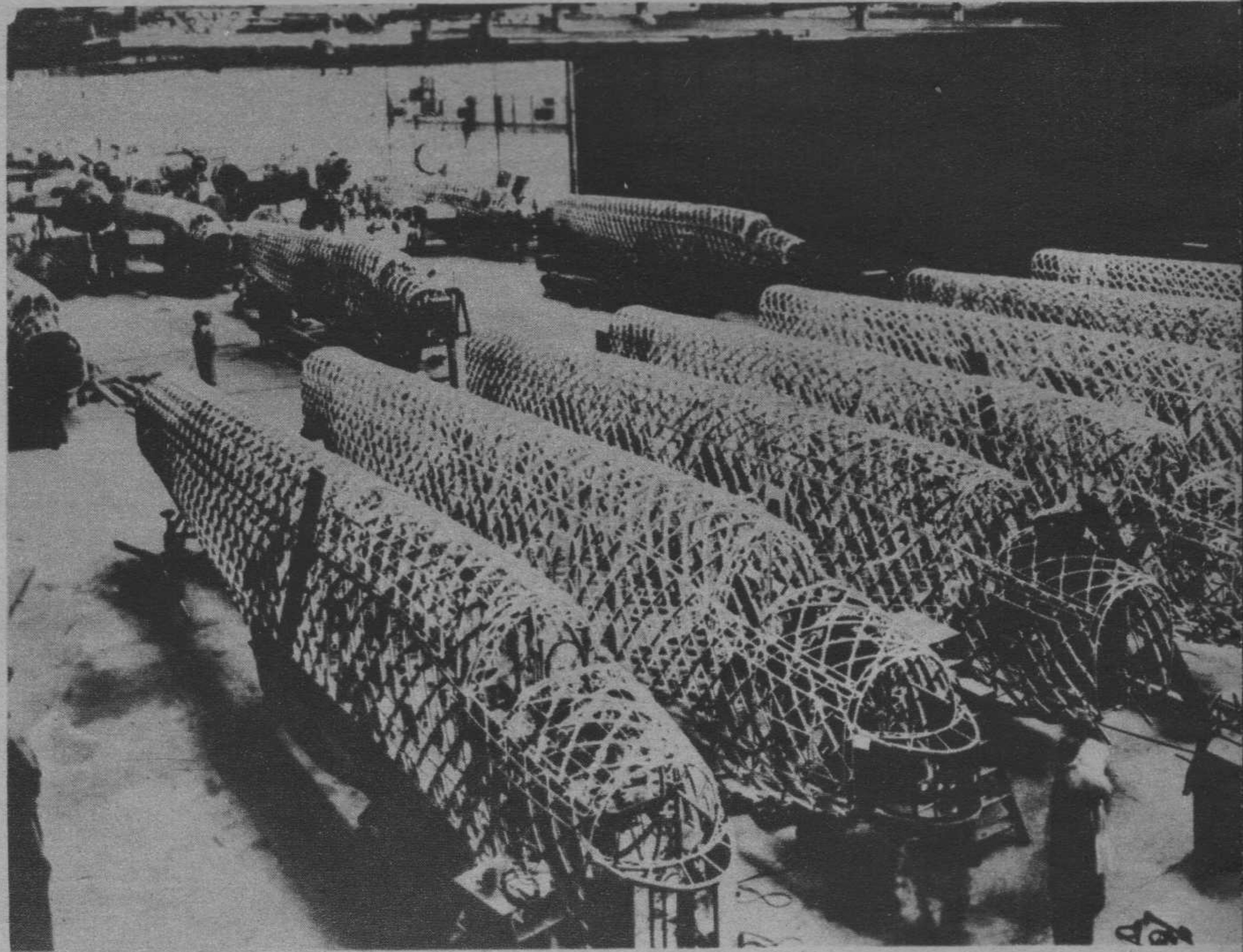


Look out below! This exceptionally fine shot shows the first of a formation of Northrop attack planes "peeling off" from the formation to begin a diving attack. Of particular interest are the four fixed wing guns and flexible one aft. Ships do 22 m.p.h.

THIS WINGED WORLD



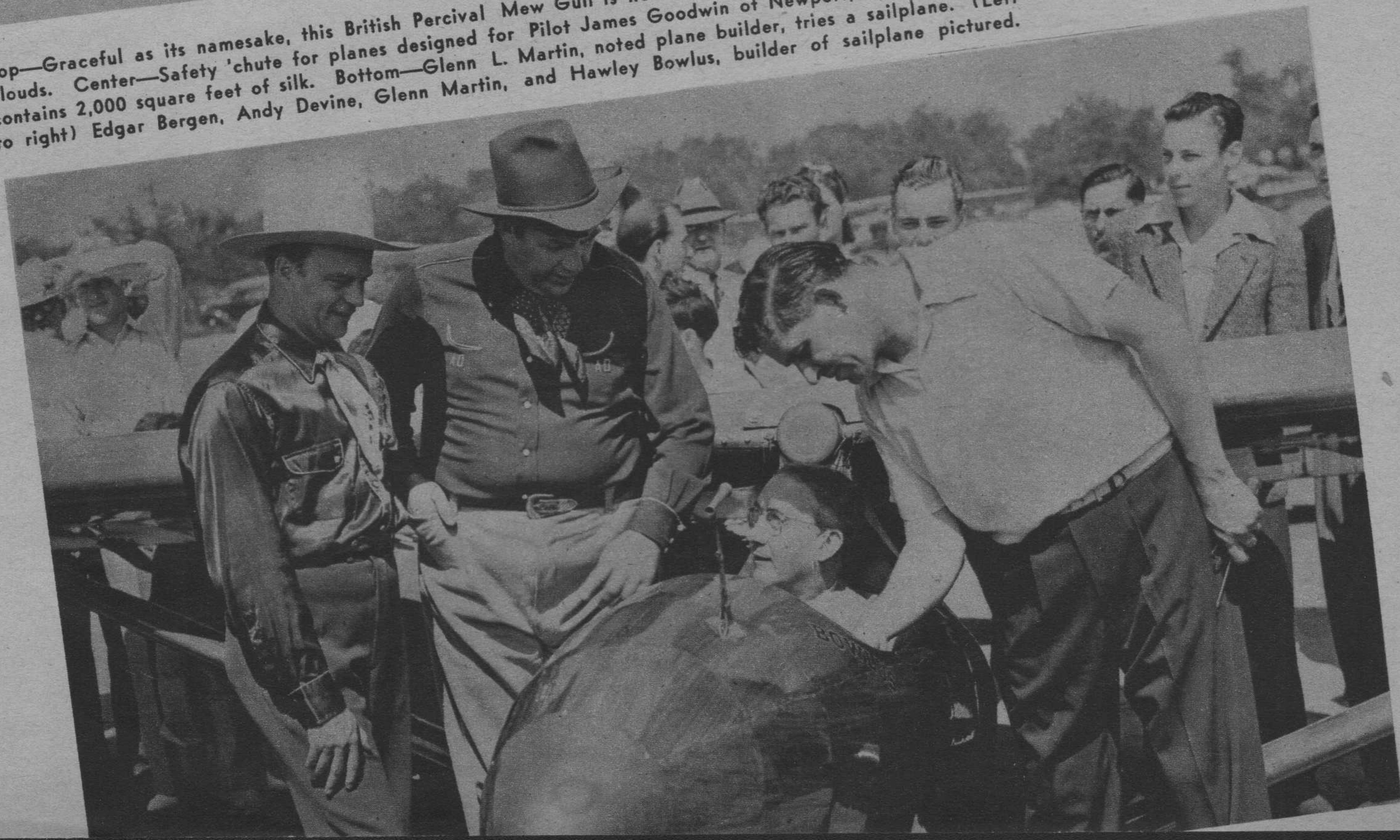
War wings over water. This Wellington bomber of Great Britain with tail turret has apparently quilted wings due to geodetic construction.



Putting their eggs in several baskets. These basketlike geodetic fuselages of the 3,000-mile Wellington bombers can carry plenty of British eggs.



Top—Graceful as its namesake, this British Percival Mew Gull is flown by Captain Percival high over the clouds. Center—Safety 'chute for planes designed for Pilot James Goodwin of Newport, Ky. This 'chute contains 2,000 square feet of silk. Bottom—Glenn L. Martin, noted plane builder, tries a sailplane. (Left to right) Edgar Bergen, Andy Devine, Glenn Martin, and Hawley Bowlus, builder of sailplane pictured.

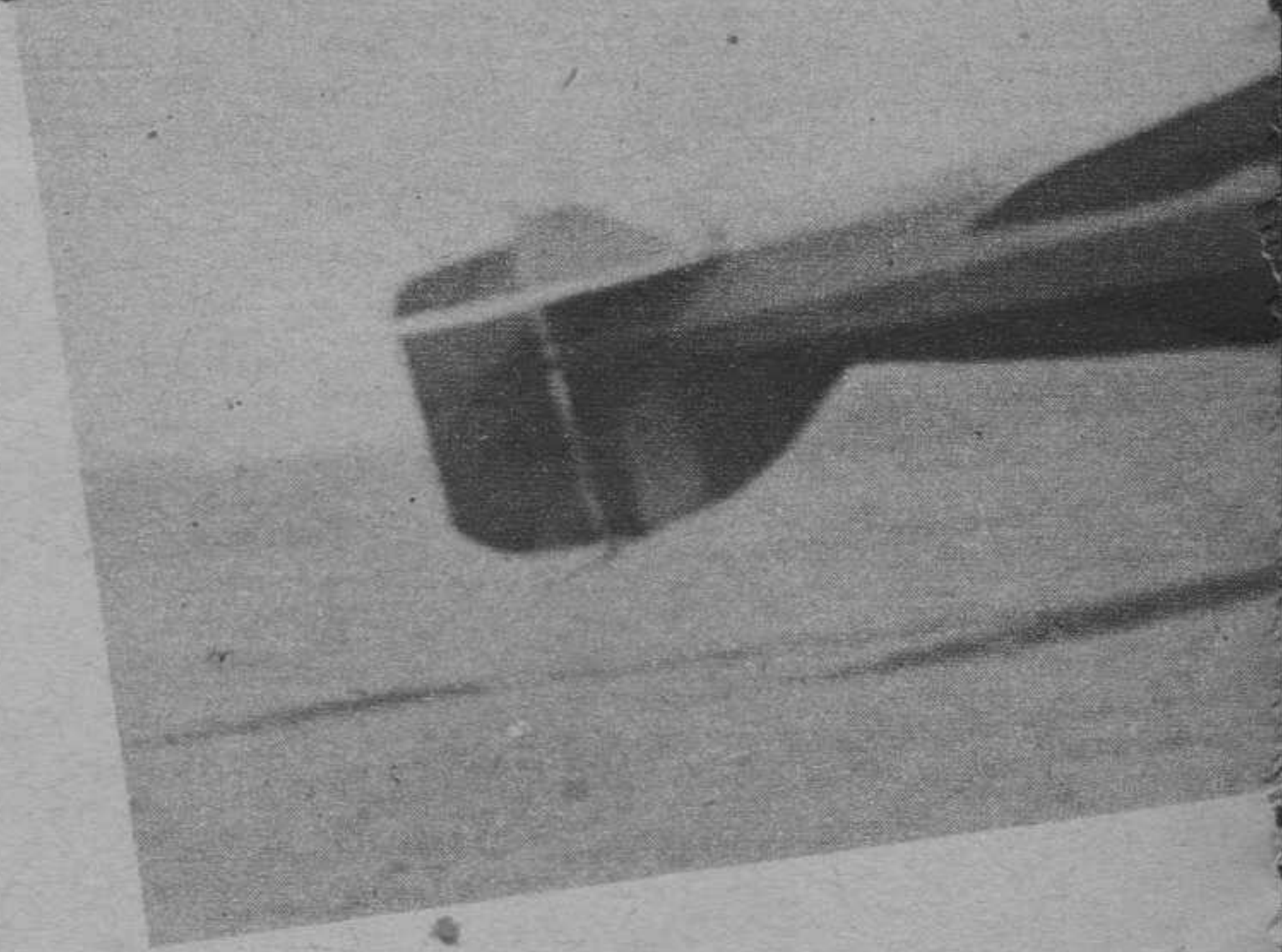
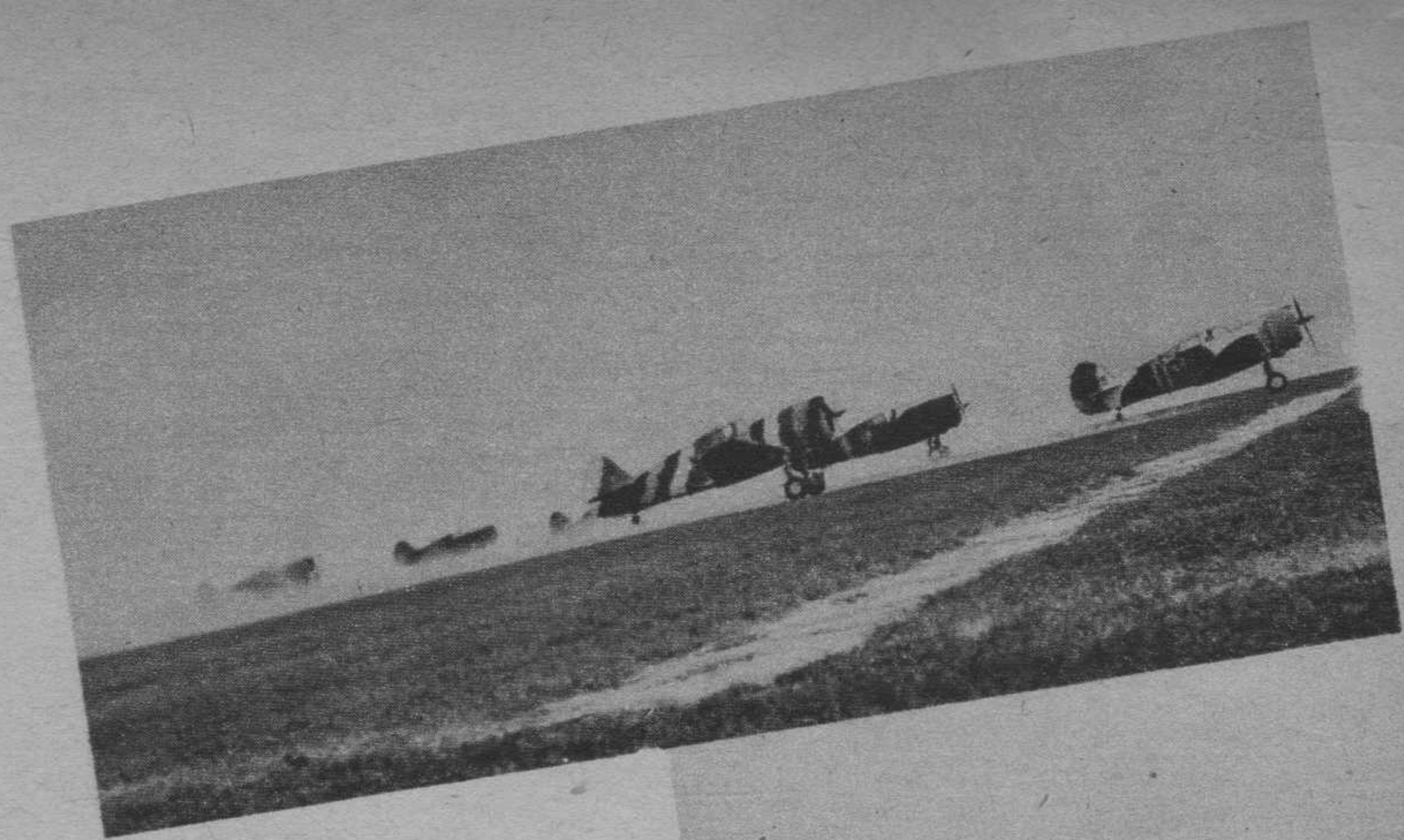


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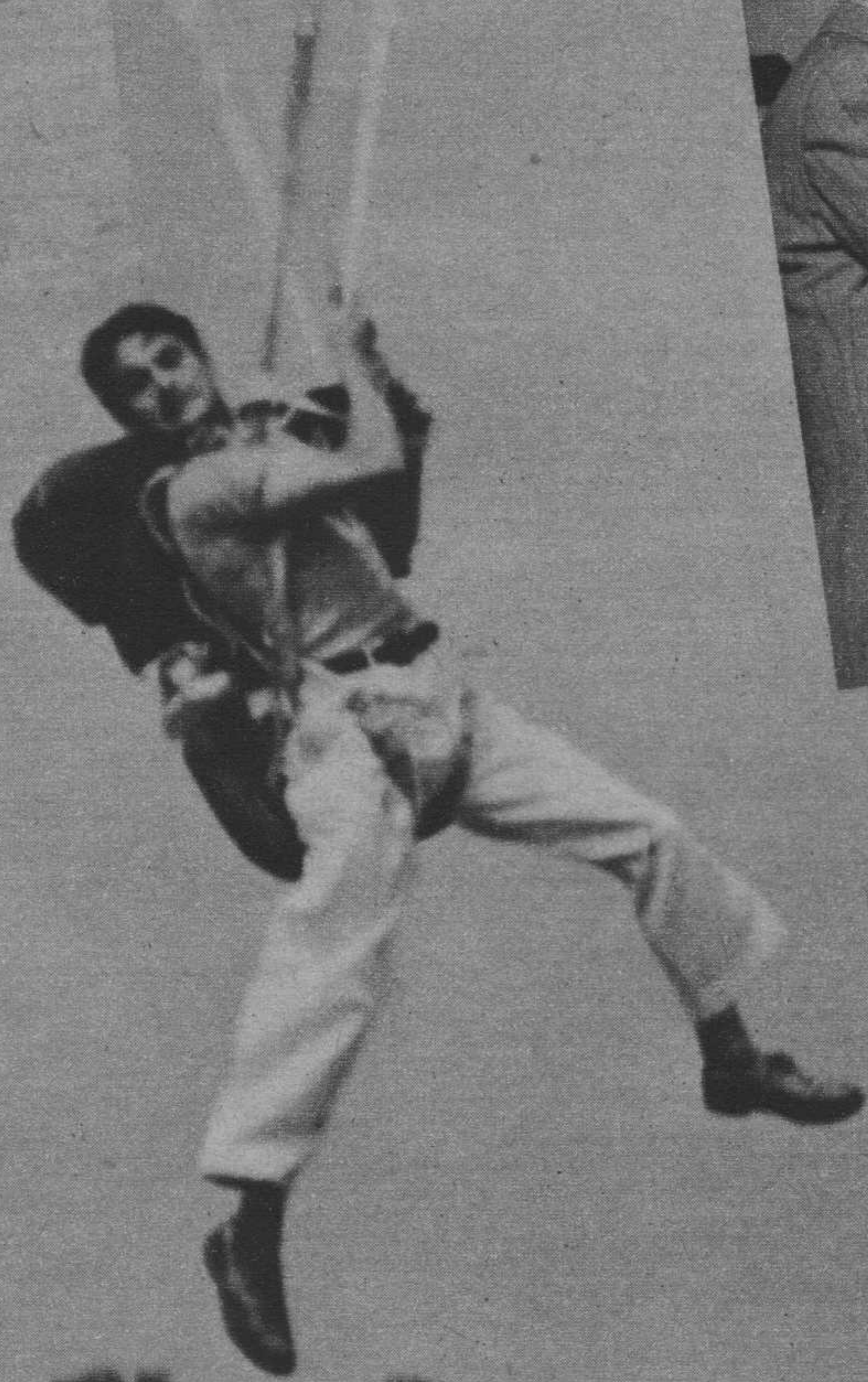
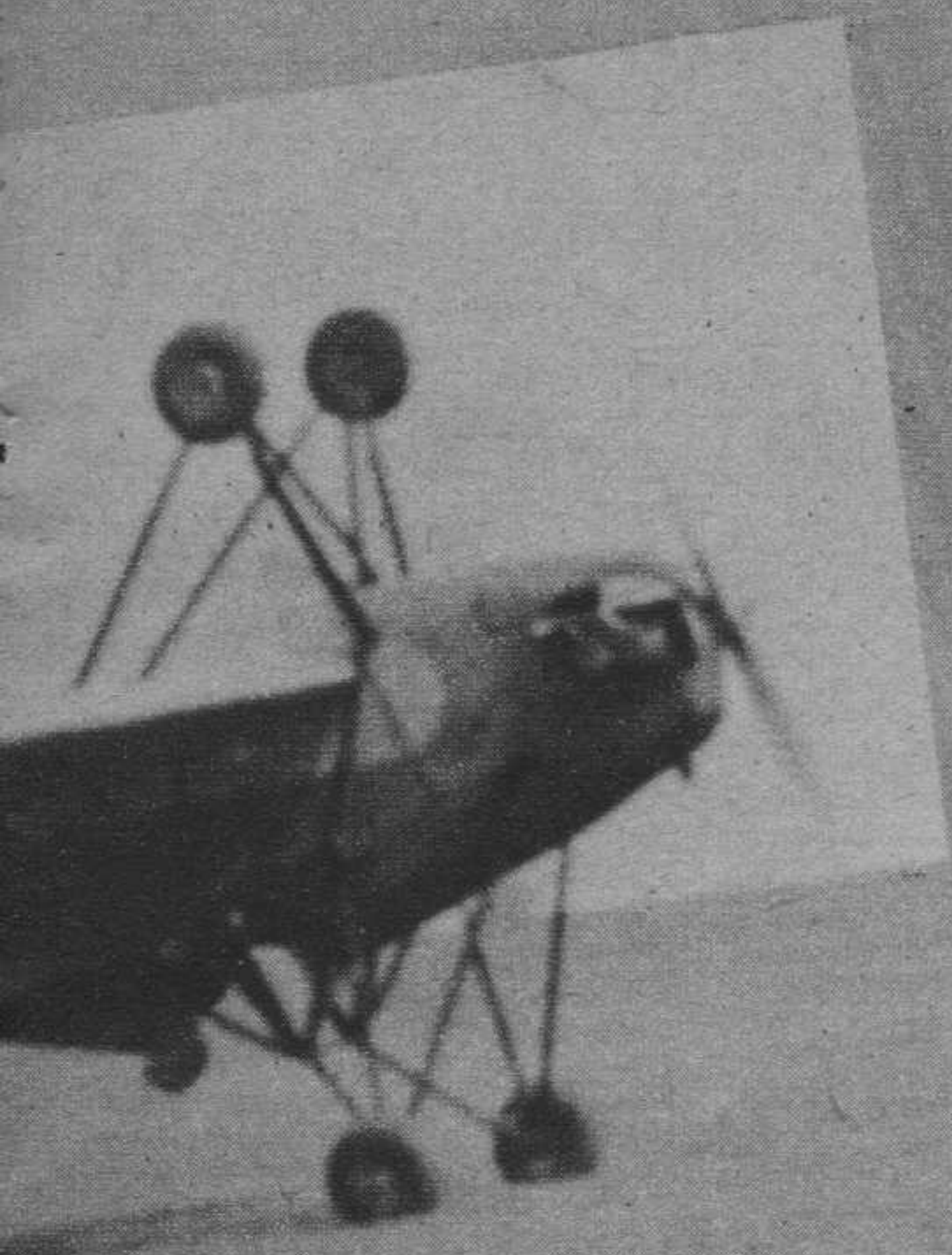
The army did its stuff with Curtiss P-36s for the cash customers; and right, Mike Murphy with his precision stunt flying typified the unusual program features of the three-day show.



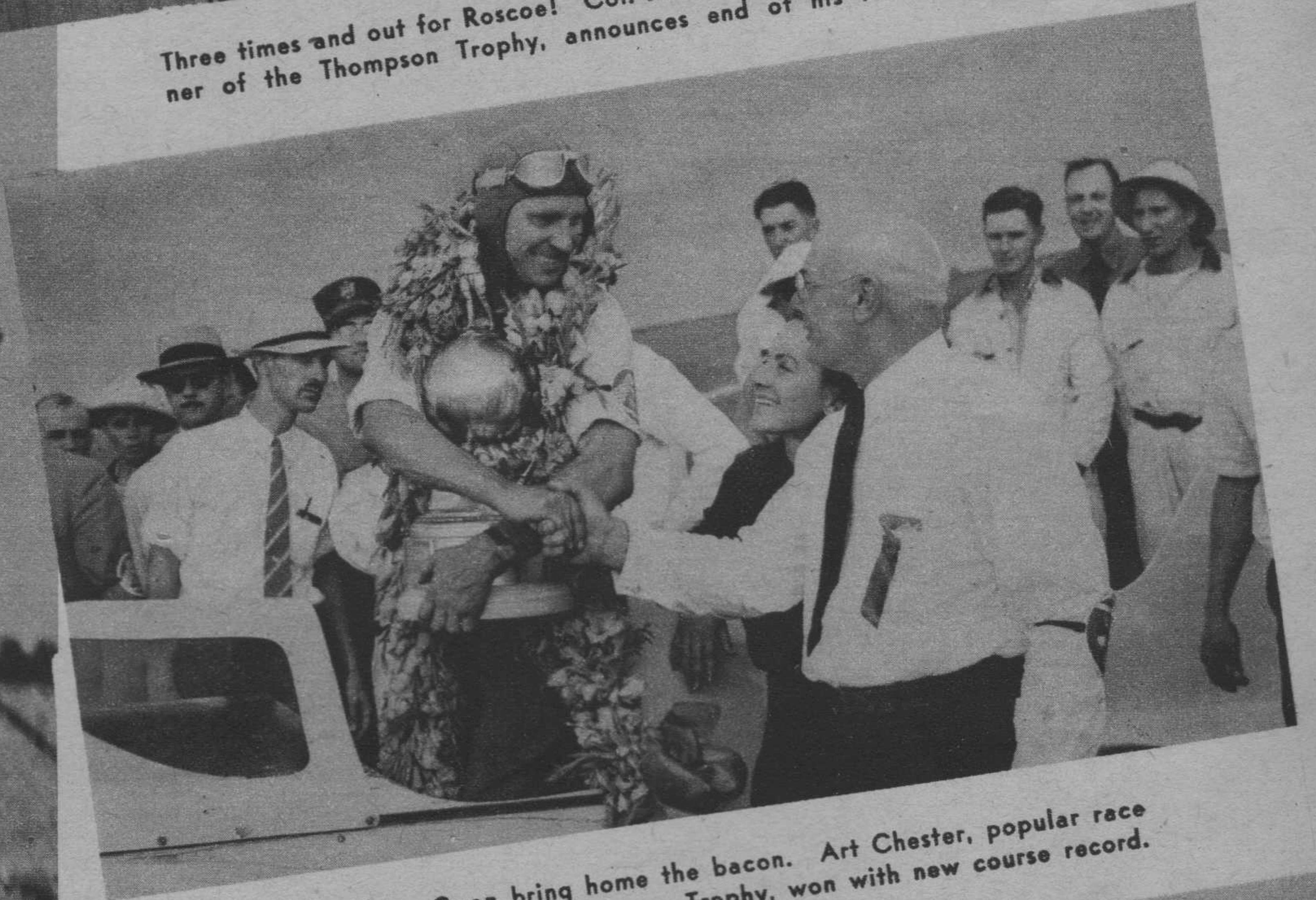
Left—Wings of the Russian bear tested in flight. The gigantic U. S. R. L-760 Maxim Gorky bomber-transport with six liquid-cooled engines. Below—A bright spot against the dark background of warring nations is the new Vultee V-12 attack-bomber of sensational performance.



Were these the last National Air Races to be held in this country?



Three times and out for Roscoe! Col. Roscoe Turner, three times winner of the Thompson Trophy, announces end of his racing career.



Art and the Goon bring home the bacon. Art Chester, popular race pilot, clutches the famed Greve Trophy, won with new course record.



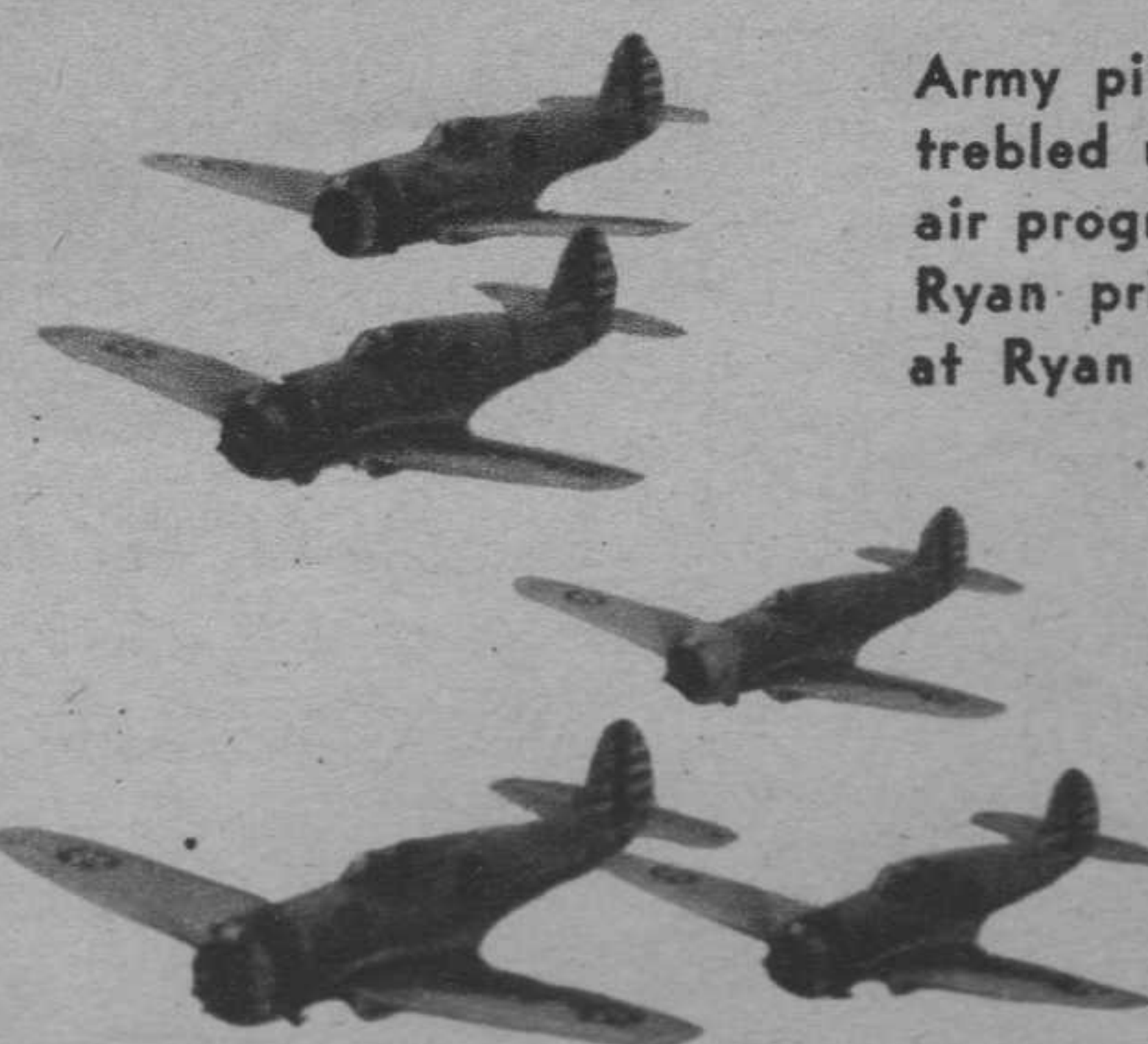
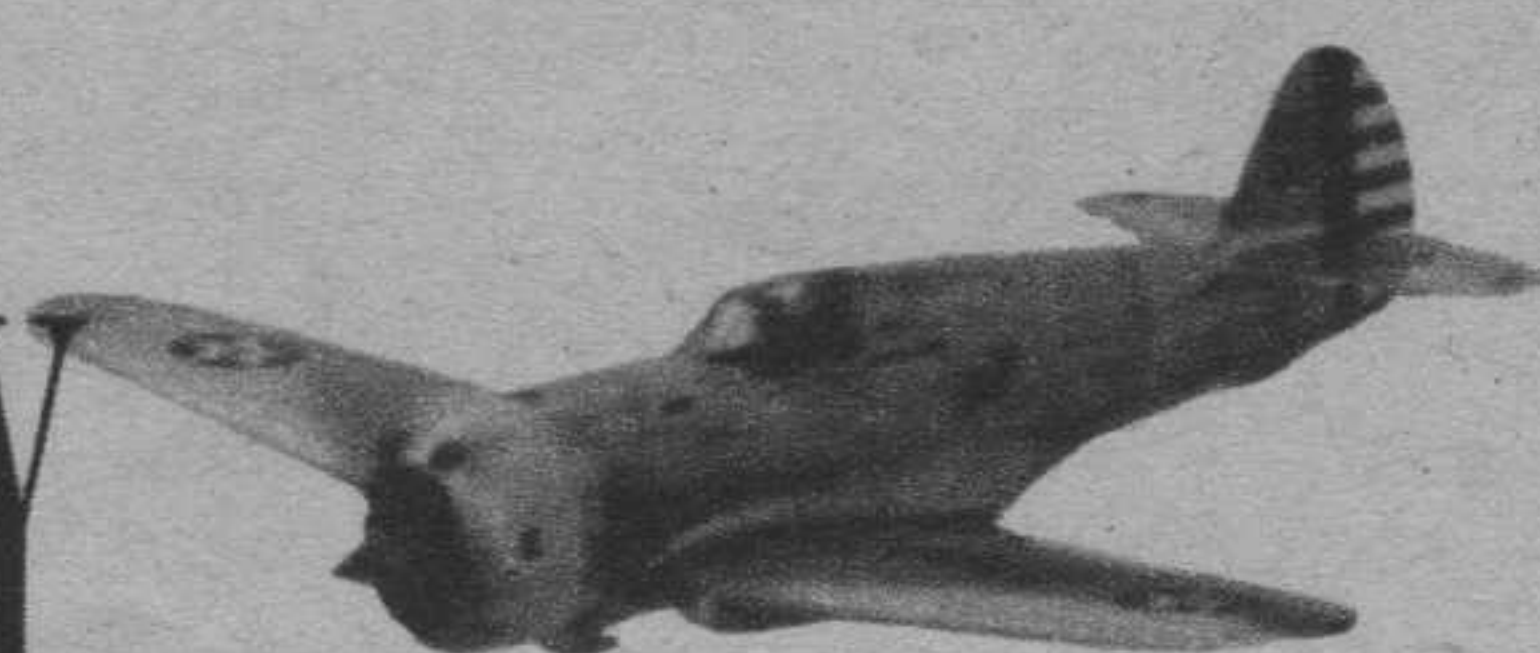
Two for one! A trophy and a new record for Frank Fuller as the 1939 Bendix winner. Vincent Bendix congratulates him at finish.





Army pilot training must be trebled under the intensified air program. These are new Ryan primary training ships at Ryan school, San Diego.

SHOULD ARMY AND NAVY AIR FORCES COMBINE?



The "Saratoga" and the "Lexington," seen from the old carrier "Langley." The navy now has six carriers.



THE Four Horsemen are again riding the winds. Again the old bugaboo of a unified air service is creeping out from under the rock where, since the time of General William Mitchel, it has been hiding like something afraid of the light.

If you don't think it's a touchy subject just try to get a public utterance from some ranking officer of either the army or the navy. Conversely, both services are for it—with restrictions. If there is to be a unified service each wants to have the controlling voice in its affairs. Both services are afraid the control might slip into the hands of some political appointee whose knowledge of things aviation, especially that branch pertaining to the military, would be reckoned as so many votes or so much patronage for his party.

After all, the majority of the personnel of the army and navy are Americans who have the welfare of the United States at heart, and they know that the one thing that would most tend to nullify any good of a unified service would be to place it in the hands of a vote-catering politician.

Actually, although they do not express themselves in so many words, this seems to be the greatest stumblingblock to operating the air services under one head. Thus, avoiding the argument that might cost them numbers in the promotion list or actually become the indirect cause of their retirement from the service, the men most involved fight the issue with words which do not at all express their real meaning. And they get nowhere.

Both army and navy men fear for the effectiveness of aviation units if these are under a politician. Why? Because politicians would be inclined to give out contracts for the manufacture of equipment, from planes to gasoline, to the persons controlling the most patronage, regardless of merit. Or perhaps things would hang fire and they would dicker until the enemy was pounding at the door, and then they'd rush willy-nilly and gather up whatever they could to defend the voters. It's no wonder both the army and the navy are wary of such a prospect.

Europe today presents to us the proving ground of aviation in warfare. It will also give us the answer to the unified air service. England, France and Italy have for many years past been using this system. In fact, most of the European nations have adopted this method of handling their air forces, though with the exception of the first three their navy air forces are negligible.

During the World War (the one that was to end all wars), England had two separate air units: the Royal Flying Corps, that was a part of the army, and the Royal Naval Air Service, that was supposed to operate with the Royal Navy.

But the navy, as far as fighting was concerned, was inactive for the most part, so the pilots of the R. N. A. S. trained on landplanes instead of flying boats. Pilots who were too big or too heavy-handed to handle one of the tiny sensitive scout planes were assigned to the heavy seaplanes and duty with the fleet or coast patrol. Those who qualified as combat pilots were assigned to fighting squadrons in France, usually with the R. F. C. But of one thing you could always be certain—the Royal Naval Air Service, being the senior service, *always* got the best of everything, pay, airplanes and assignments.

Seeing things pulling counterwise, England finally decided to experiment with a unified air service, and so was born the Royal Air Force, taking in every unit of the Royal Flying Corps and the Royal Naval Air Service. And the idea's worked so well that it is still in force today during this second world war. True, until now there has never been another major war to test their modern equipment, but under all peacetime trials it has stood the test.

England placed her air forces in the hands of an Air Minister who can, if deemed expedient, call every plane away from the fleet for service ashore, or, if it were possible for her to engage anything like her equal in naval strength, her landplanes could be assigned to co-operate with the seaplanes, *in toto*.

Today there is still the misconception that fighting over the ocean must be done by seaplanes. Seaplanes, however, are not so fast or maneuverable as landplanes, nor can they carry an equal cargo of bombs. But because they are not equipped with pontoons or boats it is generally considered unsafe for landplanes to venture away from the coast line.

Not so many months ago huge American Flying Fortresses flew seven hundred miles out to sea on an interception problem and accurately picked up an incoming ocean liner which, had it been an enemy, could have been bombed. Did the navy welcome the fact that land bombers in the service of the army could help defend our shores from an enemy? Not for one minute. They roared to high heaven that the army was trespassing on their territory, the sea.

The neutral argument of this question should be not so much that the navy or the army has jurisdiction over certain parts of our domain, but that American airplanes, of whatever service, intercept and destroy any enemy that approaches our shores with hostile intent. It is a great fulfillment of faith that a pilot in a land ship is capable, and willing, to brave the rigors of the sea and fly far beyond the limits of his natural sphere of operations to contact and destroy any enemy that might threaten the security of the United States. A faith like that calls for cohesion of effort and not bickering for choice positions.

Despite the belief that seaplanes are safer over the ocean, landplanes have just about as much chance in case of accident as the strongest seaplane.

The fact that landplanes can and do cross the ocean and are capable of flying hundreds of miles out to sea and delivering their cargo of bombs or engaging an enemy in combat has changed the character of the air service considerably.

Most naval fliers receive their initial flying instructions on land machines, and when they have become proficient they are given instruction on seaplanes. In the army only a small per cent of the fliers ever receive instructions on water craft.

The navy wants its fliers first of all to be sailors, or perhaps a better term would be navy men. They must (Turn to page 62)

BY CAPT. TRACY RICHARDSON

We are almost alone in having separate air forces. Does this imperil U. S. defense?

Right—Brig. Gen. Wm. Mitchel, famous for advocacy of a unified air force.
Below—A Brewster shipboard fighter.



RED FLANNELS

Even giant winged transports prepare for winter with many items for comfort and safety.



Arrows point to rubber de-icing boots.

FOR AIRLINERS

BY DICK KIRSCHBAUM

BELIEVE it or not, but the frost is on the pumpkin for the air lines. The pumpkin, in this case, being the leading edge of the wing, tail assembly, prop, carburetor and other vital parts of the big transports which hit altitudes and temperatures the earthbound human seldom contemplates, much less experiences.

In other words, while the average citizen is still wearing his shorts, the maintenance men of the nation's air lines are busily engaged in putting the winter flannels on their charges.

In this case, the flannels, for the most part, aren't flannels at all, as you clever people have doubtless surmised, but are of rubber. Rubber boots are deftly riveted on where they'll do the most good; long, black plasters which curl affectionately around leading edges, throbbing in rhythm with the heart of the engine, doing their job of breaking up particles of ice and sleet which are gathered in flight.

You might think it a little early to take such precautions. Listen to this: A few months ago the writer was slowly navigating around Newark Airport, sweltering in spite of his featherweight slacks, paper-thin sport shirt and open-work Mexican *huaraches*. It was hot, and that statement needs no qualification. The sun was blistering down relentlessly; the field was parched for lack of rain. The runways sent out a dizzy shimmer of heat waves and passengers waiting at the ramps were perspiring diligently.

A huge liner roared over the field, circled and landed. We watched listlessly until it taxied to the ramp. Then we snapped out of it, because in all this almost unbearable heat we saw, of all things, de-icers on the wings of the ship.

We were annoyed at what we believed was carelessness on the part of the shop crew. What right had they to leave de-icers on a ship in such torrid weather? We pushed our way through the heat waves to the hangar and tackled the chief mechanic.

"Pete," we said, "a joke is a joke, but do you think there is anything subtle in putting de-icers on a ship when the temperature is breaking a hundred?"

Pete looked at us in disgust. "Joke, hell!" he said inelegantly. "Those de-icers are there because they belong there. Just because it's hot down here doesn't mean a plane, flying on top, won't encounter an icing condition. They don't care about seasons up there. It gets cold, and when it gets

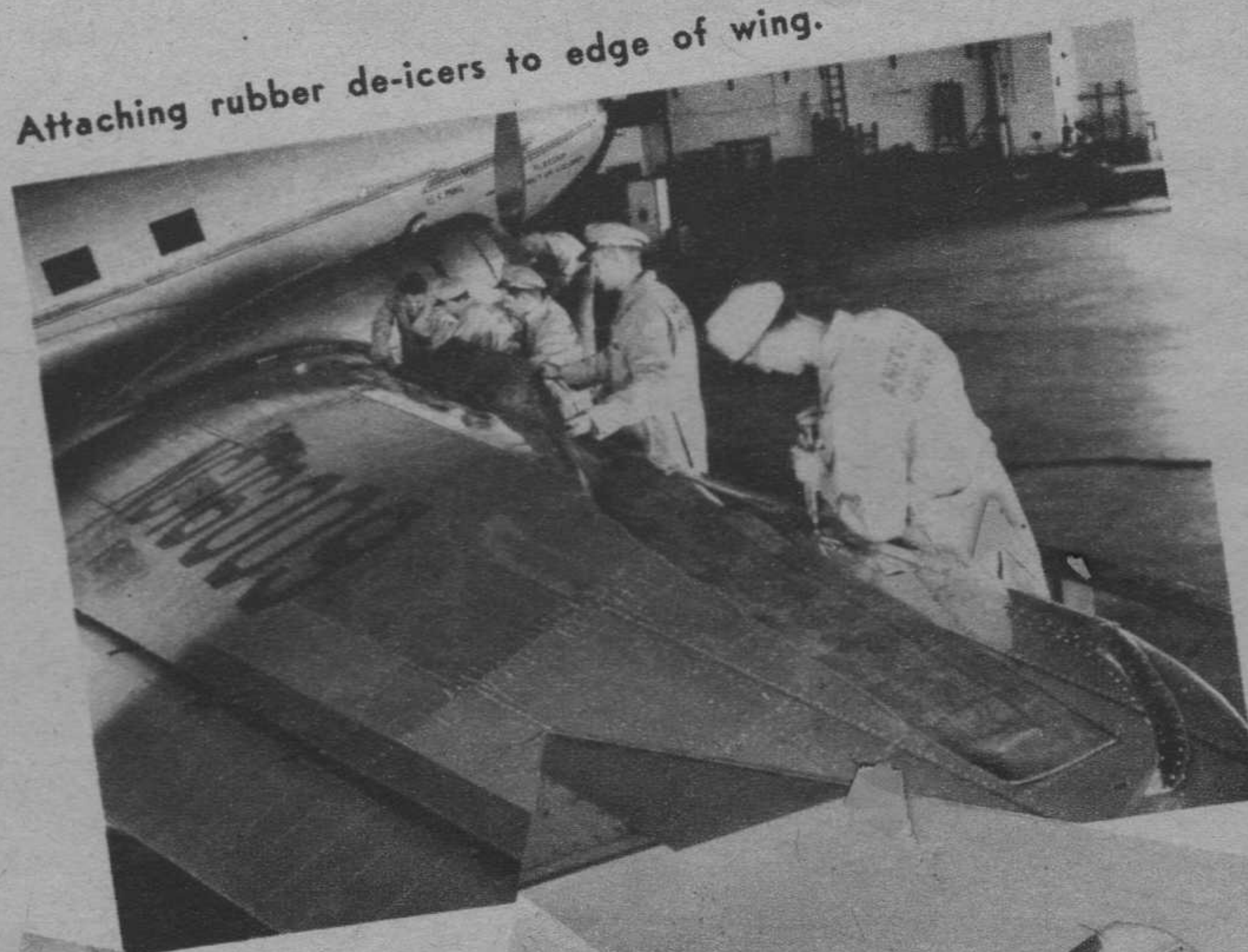
cold and there's moisture, there's gonna be ice! Not a lot of it, to be sure, but we don't fool around with even a little bit. I'll bet if you ask that pilot getting out of the ship he'll tell you he ran into a minor icing condition, at least."

We did, and he did. That is, the pilot told us he had encountered sleet at thirteen thousand feet. Only for a brief moment, but there it was.

Ordinarily, air lines start outfitting their equipment for the winter in September, and every ship on the line is warmly dressed by the first week in October. Even the silver fleet of Eastern Air Lines, which flies to Miami and the South, dons the rubber boots.

Don't think for a moment that the wings (Turn to page 48)

Attaching rubber de-icers to edge of wing.



"Even in summer some ships wear 'em."



Air-conditioning unit heating cabin of a transport.

CAMOUFLAGE?" says John Public. "Oh, yeah; that's the trick of painting cannons and things with crazy stripes of color, so you can't see them. It started during the World War, didn't it?"

The answer is no, John. Camouflage is merely a modern term for a tactical device as old as war itself. It has been employed in one form or another in almost every conflict since history began. The use of colors and broken patterns to imitate the effects of light and shade in nature, for the purpose of deceiving the enemy, has been well-nigh universal.

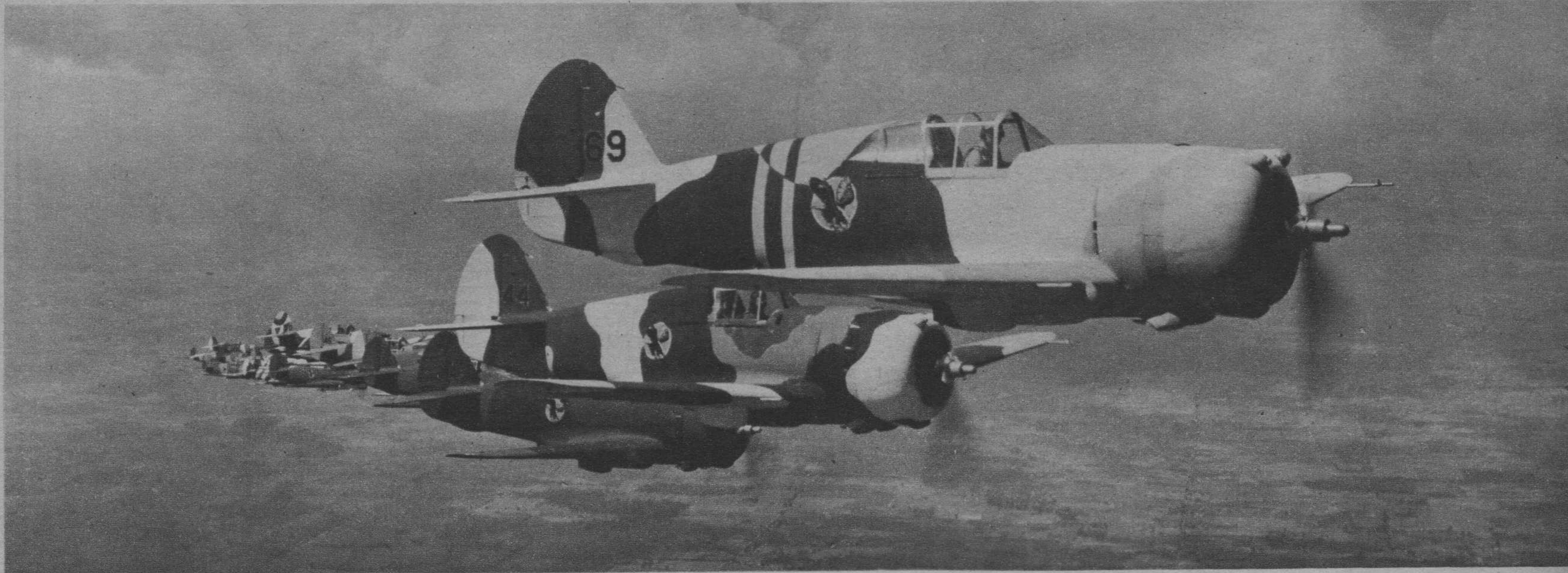
Protective coloration as applied to army aircraft appeared late in 1916. The Germans seem to have been the first to use it, and their Halberstadts, L. V. G.s and Albatrosses shed their bright colors and replaced them with the dull, crazy-quilt tints of camouflage. Various arrangements of design

SAND and SPINACH

BY FRANK TINSLEY

Camouflage runs into queer problems when applied to aircraft—here's how it's done.

Believe it or not, there are fifteen planes in this group of "daubed" P-36s!



and color were tried, ranging from regular, geometric patterns applied at the factory, to the wildest sort of daubs executed by field mechanics.

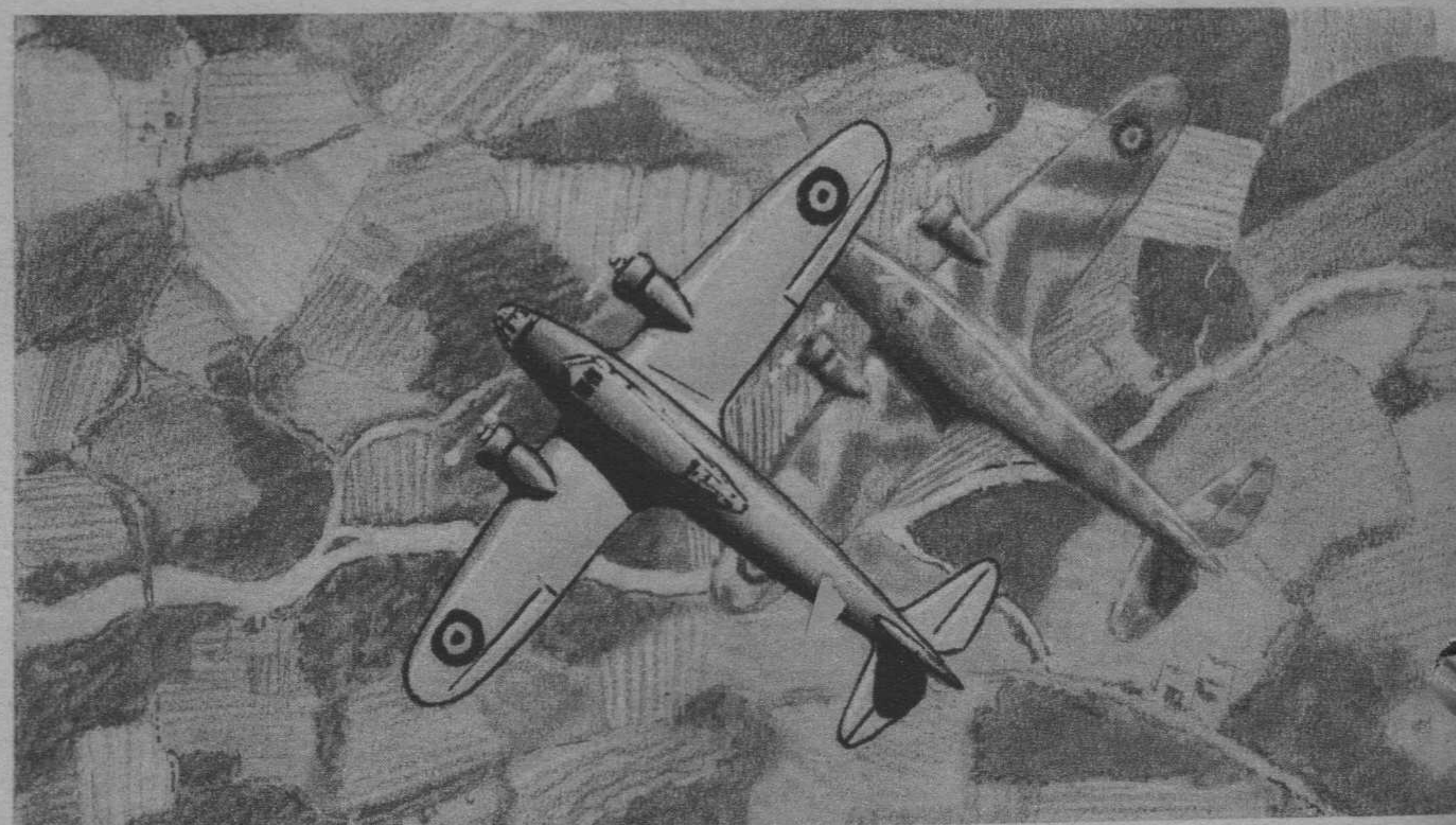
Allied air units quickly followed suit, displaying a tendency toward the irregular, stripe designs of ground camouflage. The prevailing colors used by both sides were tones of green, yellow and brown, with occasional flecks of red. Long-range night bombers were either given an overall coat of dull black, or finished with drab tops and sides and dull-black bottom surfaces. Many of the English fighter squadrons adopted the practice of painting the under surfaces of wings and fuselage a pale, sky-blue color. In all cases, both Allied and German, recognition colors and symbols were of course retained.

During the years following the Armistice the use of camouflage for aircraft was discontinued. With the revival of dress uniforms for the personnel of post-war armies, peacetime color schemes were created for military airplanes. The standard national insignia were augmented by varicolored identification stripes and numerals together with squadron crests and mottoes.

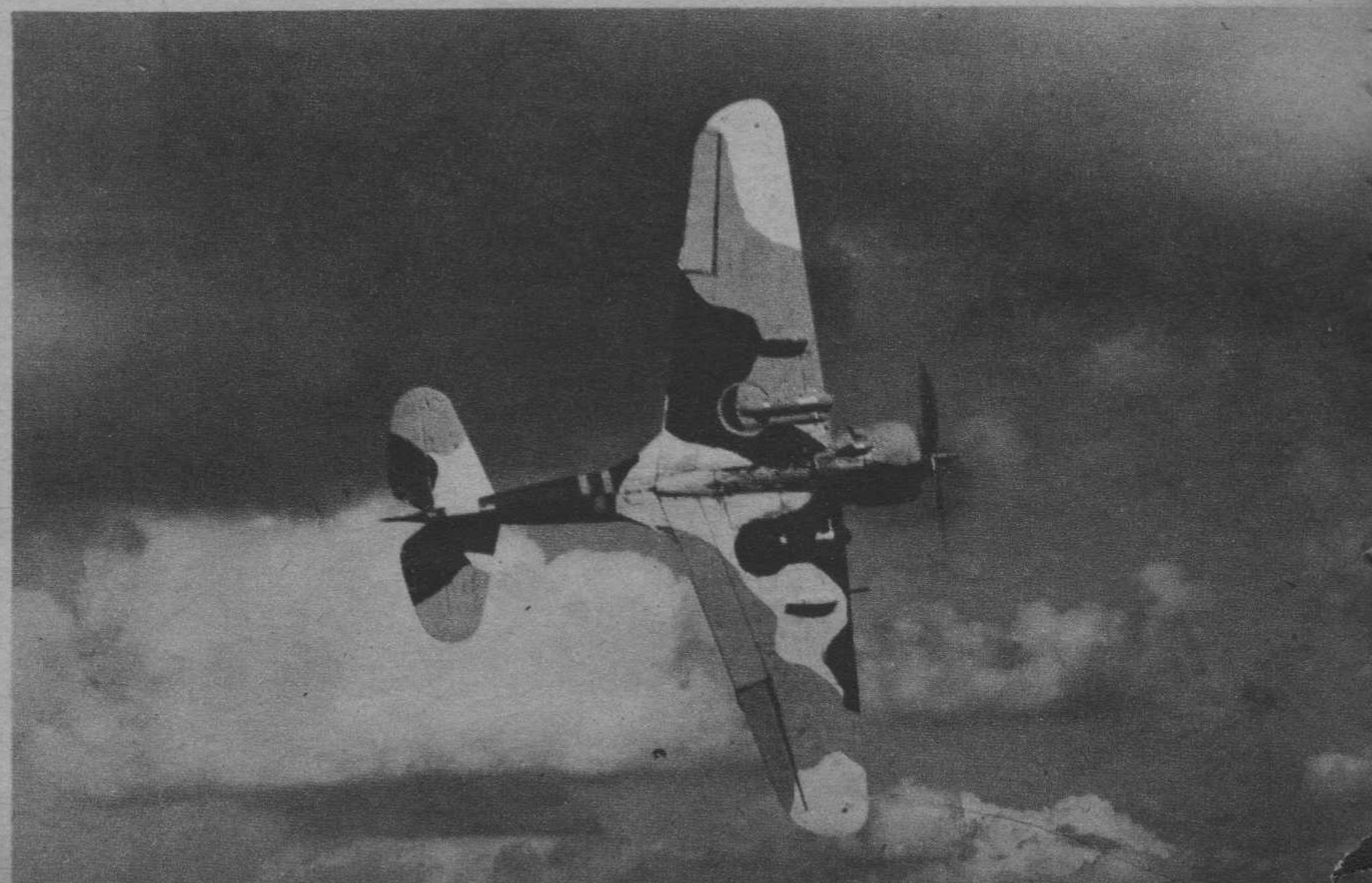
Then the continued crises in various parts of the world had the effect of placing almost every great air force upon a war basis, and this automatically reinstated camouflage as a regulation finish. Practically all protective coloration used today follows standardized patterns, scientifically developed for each particular type and model. They are put on at the factory, leaving only the individual identification markings to be applied by the unit to which the machine is assigned.

In working out these standard colors and (Turn to page 55)

This drawing shows relative visibility of ship with and without camouflage.



A neat example of how "sand and spinach" blends with cloud formations.



THE CHINESE LIKE IT STORMY

JACK FRY, president of T. W. A., in an editorial in Air Trails, advocated the introduction of special freight-carrying airplanes to be used in making a study of bad-weather flying. They would be testing laboratories for planes and a school and proving grounds for future air-line pilots. It's an idea we will sometime see carried out here in the United States.

Today this exact condition already exists in the Republic of China, the difference being that it is no longer an experiment but an accepted, proven condition of progressive aviation. A fine example of what can be done in aviation under the spur of necessity.

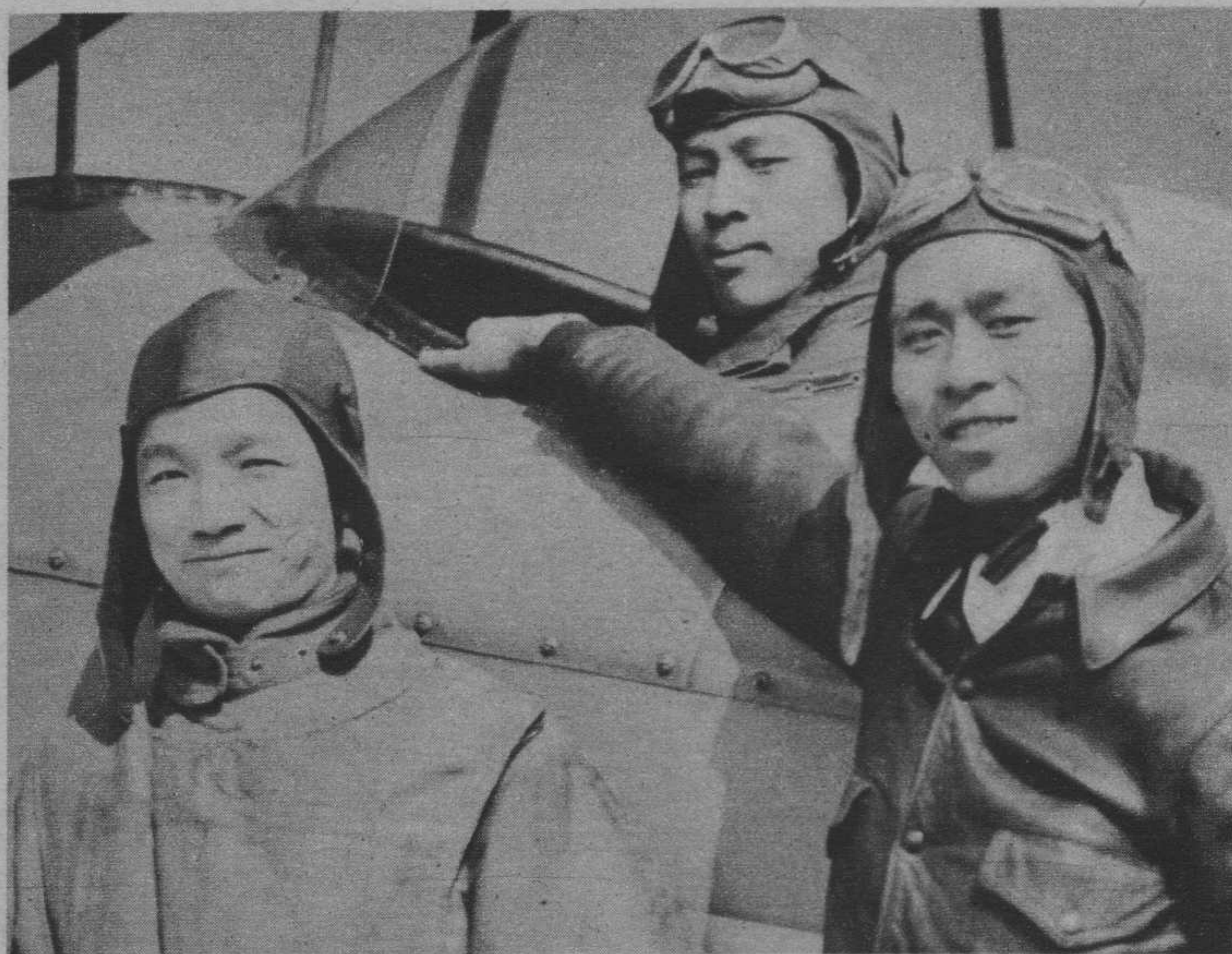
In China—in that part of the republic still controlled by the Chinese—when it's clear and visibility unlimited the transport planes are hidden away in camouflaged hangars, under trees and in narrow dark ravines. Everywhere except in the regular well-marked hangars visible from the air. The minute the rain comes down, the fog rolls in or the clouds are playing tag with the tree and mountaintops, and the best they can say of the weather is "overcast, visibility limited," the hum of activity resounds and soon transport planes are winging their way over the roughest, most dangerous terrain in the world.

They bore through black storm clouds. St. Joseph's fire rolls along their wings like the never-to-be-forgotten "flaming onions" of World War days. The planes shudder and vibrate under the loads of ice on wings and propellers and finally spiral down out of nowhere to an almost blind landing on a field that would be called a triple threat in any part of the world.

A. L. (Pat) Patterson, who heads the China Airmotive company of Hongkong but makes his personal headquarters in Chungking, the present nationalist capital of China, gives a graphic picture of the world's greatest present-day activity in commercial aviation.

It's a story of grim determination, of dire necessity, of a mighty nation striving to survive against a more modern enemy and arising from chaotic dismemberment to conditions stronger and more advanced than ever before in her history, and setting an example to the world as to what can and is being done by transport aviation. It is, paradoxically enough, the story of a war that has driven the people not so much to military aviation as to the ultimate in proving the worth of transport aviation.

Typical of the young Chinese fliers trained in the U. S. are these three photographed beside their Bird training plane at Floyd Bennett Field. To men such as these is intrusted the vital job of carrying food and supplies over war-infested airways—day after day, month after month.



They fly only in zero-zero weather—
to elude enemy bombers. Chinese
transport pilots have developed fan-
tastic skill, perform daring exploits.



This line-up of four Douglas DC-2 transport planes in front of the hangar at Hongkong, China, indicates the modern equipment in use today.

Roughly, Japan controls the lines of communication over about one third of the Republic of China. But in between these arteries of communication, railways, highways, rivers and canals, most of the territory is still held by the Chinese, and life goes along as though there was no war blasting away in their front yard. Crops are planted, cultivated and harvested much as they have been for the past thousand years, and much of the ordinary industry is carried on as usual. Transportation, however, is at a standstill, that is, all except air transport. And the crops and industrial products still find their way to the outside markets.

Today, going into the third year of the invasion of China, their commercial air transport is numerically four times greater than it was at the beginning of hostilities. The joint Pan-American-Chinese-owned air lines, the China Airmotive company and the German-Chinese-owned lines continue to function and to expand their business.

Some of the pilots operating on the air lines of China are foreigners, but the majority are Chinese. The mechanical staffs are almost wholly Chinese, but work under the supervision of foreigners.

Patterson claims, and he's a pilot who won his wings in the World War and knows both aviation and China, that he'll back the commercial pilots of China against any commercial pilots in the world.

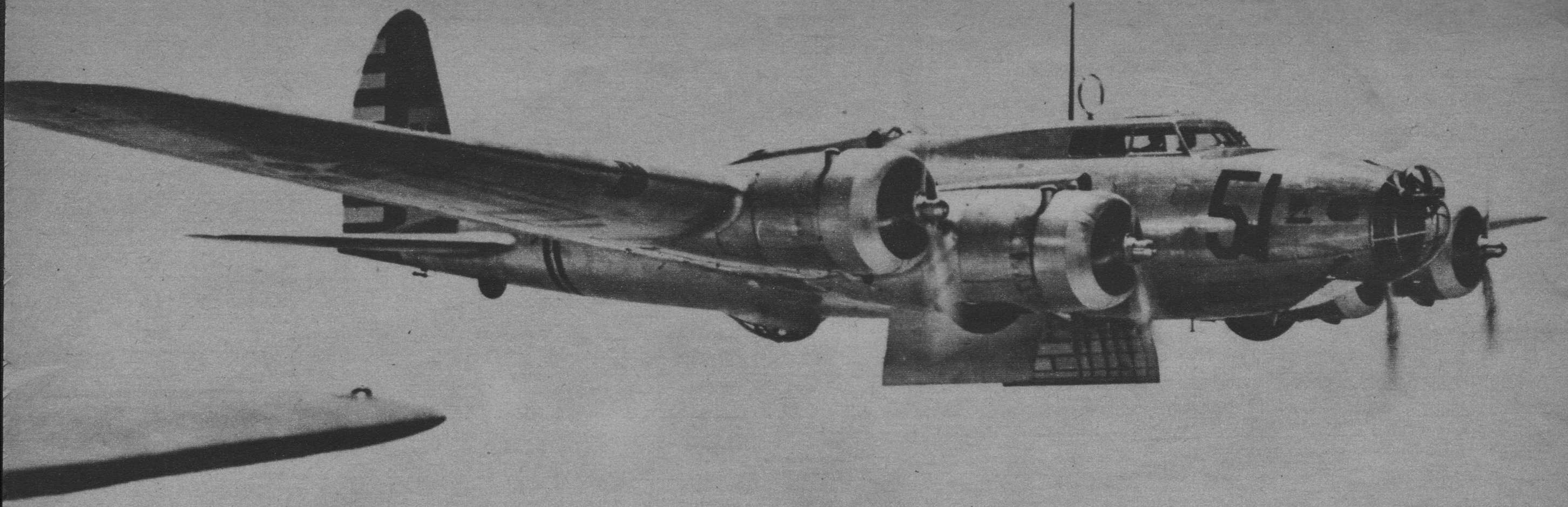
There is not one first-class commercial airport in the possession of the Chinese, yet they make seemingly impossible

flights under conditions that should ground any airplane, and go on to make landings that are little short of miracles. They do it day after day, and commercial aviation is playing a far more important part in the war than military aviation.

The commercial airport at the present national capital of China, Chungking, is located on a sand bar in the middle of the Yangtze River. There they have built a twelve-hundred-foot runway of stone. Here the river rushes through a deep gorge with the banks on either side rising hundreds of feet, and at all times it is a one-way landing. There are approximately twenty-six clear days out of the year at Chungking, and during the rainy season there is a rise of a hundred feet to the river and the runway is often under from thirty to fifty feet of water. Then they have to land wherever they can find a spot.

The landing field at Chungking is one of their best, but even under such adverse conditions they continue to expand and improve. It's hard to say whether the strain is harder on the transport pilots or on the mechanical staff. Like stoics the mechanics work under the constant strain of air raids. Enemy planes roar in from the east and the mechanics dive for their bunk holes. Bombs rain down and blast holes in the landing field and before the picnic bite of the smoke of the exploded bombs drifts away crews are busy filling them in. By the time the raiders are out of sight the field is ready for the landing of commercial aircraft.

Bombs blast the repair shops to pieces but the mechanics gather up such tools as they can find, clean (Turn to page 61)



Above—A Flying Fortress opens her bomb trap to drop 100-lb. bombs. Left—Various types and weights of army air bombs. With one exception these are demolition and fragmentation bombs, latter for ground-strafting.

Projectiles, fuses, sighting devices—aerial bombing today is a very definite science.

BOMBS AND HOW THEY WORK

BY COLIN
KERR
CAMERON

THE story of airplane bombs goes back to the "borning" days of aviation. The original eggs used thirty years ago weighed just a few ounces apiece (in contrast to the two-thousand-pounders that are strapped into the racks nowadays). Equipped with spherical, pitted, thin-walled cases that were easily shattered on impact with the ground, they were colored a characteristic yellow, even as modern bombs loaded with TNT are purposely painted yellow for identification today.

A unique fluid of powerful content filled minute cells in these early projectiles. When dropped from airplanes, the spheres did little damage except in the occasional case of a direct hit on some unwary individual. They could hardly be classed as major military weapons. Nevertheless, they served well in allowing the early aeronauts to demonstrate their prowess at simple target practice.

Yep, those original "bombs" were—*oranges*!

They made swell projectiles for the barnstorming "peelots" of Early Bird vintage. A few of the lads preferred to use paper sacks filled with flour for their bomb-dropping stunts. Said the flour was more "showy."

Much soup has slipped through the carburetors since those experimental days, and amazing indeed has been the development in bombs, bombers, and bomb-dropping technique. In the army's aircraft ordnance stores at Aberdeen, Maryland, for instance, are monstrous missiles weighing more than two tons apiece. And army plans have even been drawn up for bombs of *five* tons in total weight.

These five-tonners, it is true, have never been built except "on paper," and perhaps they never will be manufactured for actual use. They were designed strictly for experimental comparisons shortly after the World War. The two-ton eggs were developed at the same time. Only a few of

these were made, and tests indicated they were too big to be practical.

Still, in these days of bigger and better bombing planes, they could easily be given another workout. Uncle Sam's newest flying fortress, the Boeing B-17B, could easily handle a five-tonner, it would seem. Successful flight tests were recently made with a B-17 lifting a bomb load of nearly six tons under service conditions; which means carrying also a crew of six to nine men, adequate fuel for the assigned mission, five machine guns and ammunition, and flying at a speed in excess of 250 m.p.h. (By contrast, the army's first plane—the Wright Brothers' Type B—had a top speed of 42 m.p.h., weighed 800 pounds as compared to the B-17B's 22 tons, and developed 25 h.p. with its four-cylinder engine. The four Wright Cyclones of the new bomber develop 4,000 h.p.).

The biggest bomb now built for the army averages 2,000 pounds. A demolition bomb, it is intended primarily for use against enemy battle-ships, major fortifications, important bridges, and the like. The weight is proportioned about evenly between the forged steel casing and the explosive load of cast TNT.

How would you like to have one of *those* eggs dumped into your backyard?

Well, it could be dumped safely! That is, the tremendous weight and impact of the bomb itself may do some damage, but the explosion would not necessarily have to follow. Provision is made for the "safe" dropping of all projectiles, and they may be released, generally, from altitudes up to about 8,000 feet without fear of detonation.

This safe dumping in emergencies, over friendly territory, is accomplished by combining a simple little device called an "arming wire" with a strong, flawless bomb case that will not shatter or crack under the terrific shock of contact with the ground following a fall. The arming wire can be dropped with the bomb, in which case it acts as a lock and prevents the fuse from functioning. If a "live" drop is intended, however, with the destructive detonation to follow, the bomb-rack mechanism acts to withdraw the arming wire from the projectile, thus allowing the fuse to unlock and "arm" the bomb ready for action.

Bomb fuses are of various types. Some have a simple safety pin that is yanked out by the arming wire. Others, more complicated and somewhat safer, are fitted with small propellers or vanes which spin as the projectiles fall. When the props have made a definite number of revs and the bomb is a safe distance away from the plane, the firing mechanism is freed and the fuse is ready to detonate the main explosive load on impact with any solid object.

Perhaps we should make it clear here that it is not the force of the bomb striking the ground that explodes the charge. Cast TNT is a relatively "dead" explosive and normally will not "go off" on a simple shock. The fuse is loaded with a more sensitive explosive—sometimes even a chain of them. The firing mechanism ignites a primary charge, which in turn starts off a second little explosion. This fires the next link, which finally is potent enough to jar the TNT out of its laziness and produce the Big Boom.

Fuses are "timed" differently. (Turn to page 59)



Left—Maintenance crew load 100-lb. bombs aboard Flying Fortress. Below—First aerial bomb and Wright plane of the year 1910.

Right—One of the old experimental 4,000-pounders, contrasted with figure of man. Half weight was TNT.



THE EYES OF WAR



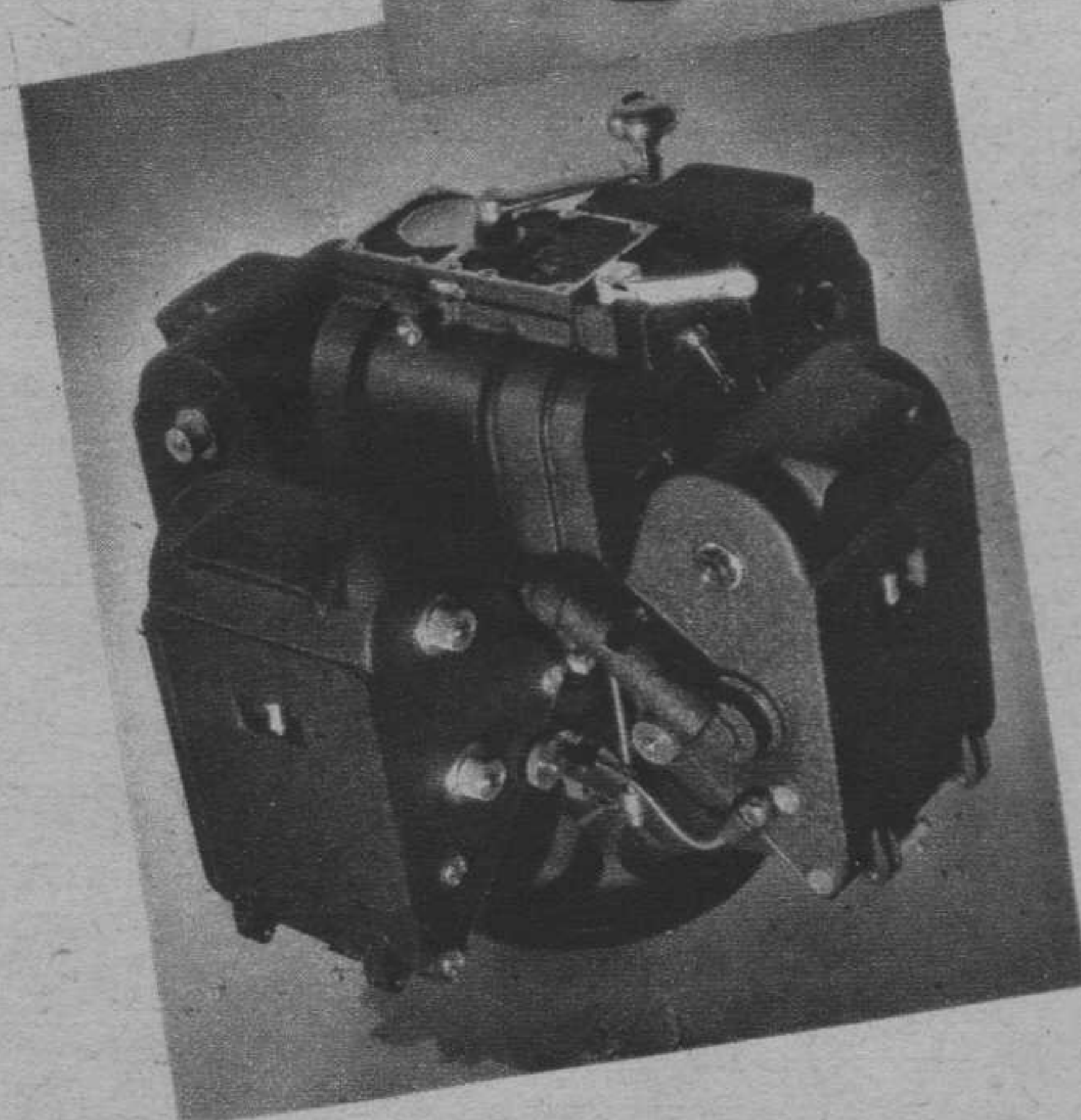
Photographer with camera for vertical or oblique work. Camera takes 110 7x9 shots on 75-ft. film.

BY HERBERT C. MCKAY

NOT many months ago a foreign military commander made this startling statement, "The army with the best photographic corps will win the next war!"

Of course aerial mapping and reconnaissance are important, but can they be that important? At the end of the World War cameras served as auxiliary eyes for the army and an excellent tickler for the memory of the observer. In fact, conditions were often such that the camera could not be used, although visual observation could be made. Today, the camera is the super eye, instantly recording details which the observer could not assimilate in a half hour and revealing minute details when the eye encounters only shifting haze.

Try to imagine actual military conditions and you can understand the officer's opinion. A new position has been taken, men are digging into temporary defenses, which are wide open to barrage and aerial attack. The whole corps is vulnerable. The only defense lies in deception. A mile behind the line a false trench is dug, only a few inches deep. It is decorated with hel-



Above—Fairchild military camera used with photo flares at night. Left—A Fairchild five-lens takes five photos at once. This makes single composite shaped like a Maltese cross.

Below, left—Time-lapse effect. Imagine each superimposed dot to indicate gun emplacement; then, middle—second time-lapse shot. Study shows altered dot arrangement. Right—Key photo made by superimposing positive of first photo over second. White dots indicate unchanged emplacements. Black show moved ones.



Latest aerial cameras, with their amazing magic, play stellar role in military strategy.

mets, bayonets and general trench debris. When the enemy flies over their concealed trenches, the true position will not be seen because the false trenches are assumed to be the true ones. Yes, such a defense would probably have been successful in 1918, but today it wouldn't fool the aerial camera a moment.

Modern military strategy depends upon information, accurate information, obtained without loss of time. The enemy move artillery into a new, well-camouflaged position overnight; submarines lie in secret harbors, with motors silent; rapid, mobile combat units move unexpectedly to new positions in the haze of battle; an effective battery is operating from behind a hill, whose height must be determined. Heretofore information about such developments had to depend upon the more or less accurate observation of man. Today the modern military camera answers the question accurately and instantaneously.

The pictures are taken in the air, and by the time the ship is grounded the negatives are developed all ready for rapid examination and for quick printing. Within less than ten minutes after grounding, the staff officers may examine clear photographs of the scene of action! And these photographs will reveal many things not visible to the eyes of the photographer who made the shots.

The penetration of opaque strata is an accomplished fact. U-boats can be photographed when the surface reflection hides them from visual observation, and when ordinary photographs would show the water as a metallic, opaque surface; ground haze can be cut through easily; even light fog and hazy smoke can be wiped away by the magic of modern photography.

During the war of 1914 panchromatic plates were still in the experimental stage, and very poor at that. Today we have a dozen or more different kinds of panchromatic films of excellent quality. Pan film, as it is called, is highly important. Briefly, we must remember that ordinary daylight is made up of all colors. The rainbow is formed when daylight is split up into its component parts. These colors run, in order of wavelength, blue, green, yellow, orange and red. Violet is the shorter component of blue. When light travels some distance the violet and blue rays get lost, are reflected and bounced about until they no longer mean anything to the eye. However, in their confused state they give the appearance of a uniform blue color. The most common example is the sky. There is no color there, nothing but empty, black space. Only the scatter of the blue produces the appearance of a solid blue dome. The same thing causes haze, the great enemy of aerial photography. Haze is simply the amount of "sky" between the ship and the ground!

The red rays are not so easily disturbed, and if we could brush away the interfering curtain of tangled blue rays, we could see right through the haze; in fact, it would disappear.

Ordinary films respond only to the blue part of daylight;

panchromatic films react to every color of daylight. Therefore if a sheet of red glass is placed over the camera lens, this glass, which we call a filter, pushes back the blue and green rays letting only the red through. By this means it is possible to make sharp and clear photographs of objects which are completely hidden to the eyes by a heavy curtain of haze. In very bad cases we go even further and make use of the invisible rays below the visible red. Such "infra-red" methods have made possible good photography at ranges of several hundred miles!

Infra-red reveals another important trick of camouflage. The enemy moves artillery into position overnight. By morning the guns are camouflaged by trees and boughs. Dumps and trench openings are concealed beneath rough, green-painted canvas. From the air the new position is absolutely invisible, yet within an hour after daylight they are shelled so heavily that the position has to be abandoned. How was the position discovered? Infra-red films have a peculiar characteristic. Green paint will photograph as dark gray or black, while living foliage photographs snow-white in this curious invisible "light." The guns and dumps are revealed as if they were coal black on a field of snow!

Infra-red has limitations. The writer of detective fiction loves to capture his man by making an infra-red shot after dark, out-of-doors. The idea is fine, but it won't work. You must first have the infra-red, and it is exceedingly rare after dark. After all, infra-red is an old and familiar friend, being merely a fancy name for heat. Daylight has plenty, so have all forms of artificial illumination except gas discharge tubes. A soldering iron will be photographed in total darkness as a white-hot iron. But you can't go aloft and shoot the enemy position at night by infra-red.

However, night photography is not ruled out. So great has been the development in film sensitivity and lens speeds since 1918—and many such developments are not yet commercialized—that effective exposures can be made now with about $\frac{1}{5000}$ the amount of light necessary twenty-five years ago. Instantaneous photographs will reveal the smallest pinpoints of light, even ones which might be overlooked by a visual observer.

Most people are familiar with the routine of mosaic mapping. A plane flies over a strip of territory, maintaining as nearly constant altitude as is practical. At the end of the trip the ship is turned and flies back a short distance to one side of the original path. Back and forth the flight is made until the whole area has been photographed in a number of narrow strips. The series of photographs thus made are assembled into a great mosaic by cutting the central portion from each and matching it to the next one.

Today multiple-lens cameras make possible the photography of a much wider area, and the fact that the plane (Turn to page 56)

Left—Aerial photo of village, showing photographic appearance of terrain when compared, left, center, with map, indicates close relationship of map and photo. Right, center—Oblique shot of mountainous country

taken from a low angle. Right—Vertical photograph of the same country. The black lines show same section taken in the oblique shot. If plane is not directly above ground, "rectification" process may be used.



GLIDING AND SOARING



A real glider train. These eight ships coming in for a landing at an airport near Moscow are part of eighteen towed behind a single airplane.

CONDUCTED BY ALEXIS DAWYDOFF

MOST of you have read about altitude flights made by Bob Stanley, Chet Decker and others, and know that in order to attain such heights the pilot had to enter clouds and fly blind in them for quite a while. In blind flying the pilot has to rely entirely on his instruments as his sense of feel is apt to play strange tricks on him. Until recently hardly any of our sailplanes were equipped with instruments and only a few of the pilots knew how to use them. However, more and more of the boys each year acquire them and learn their use.

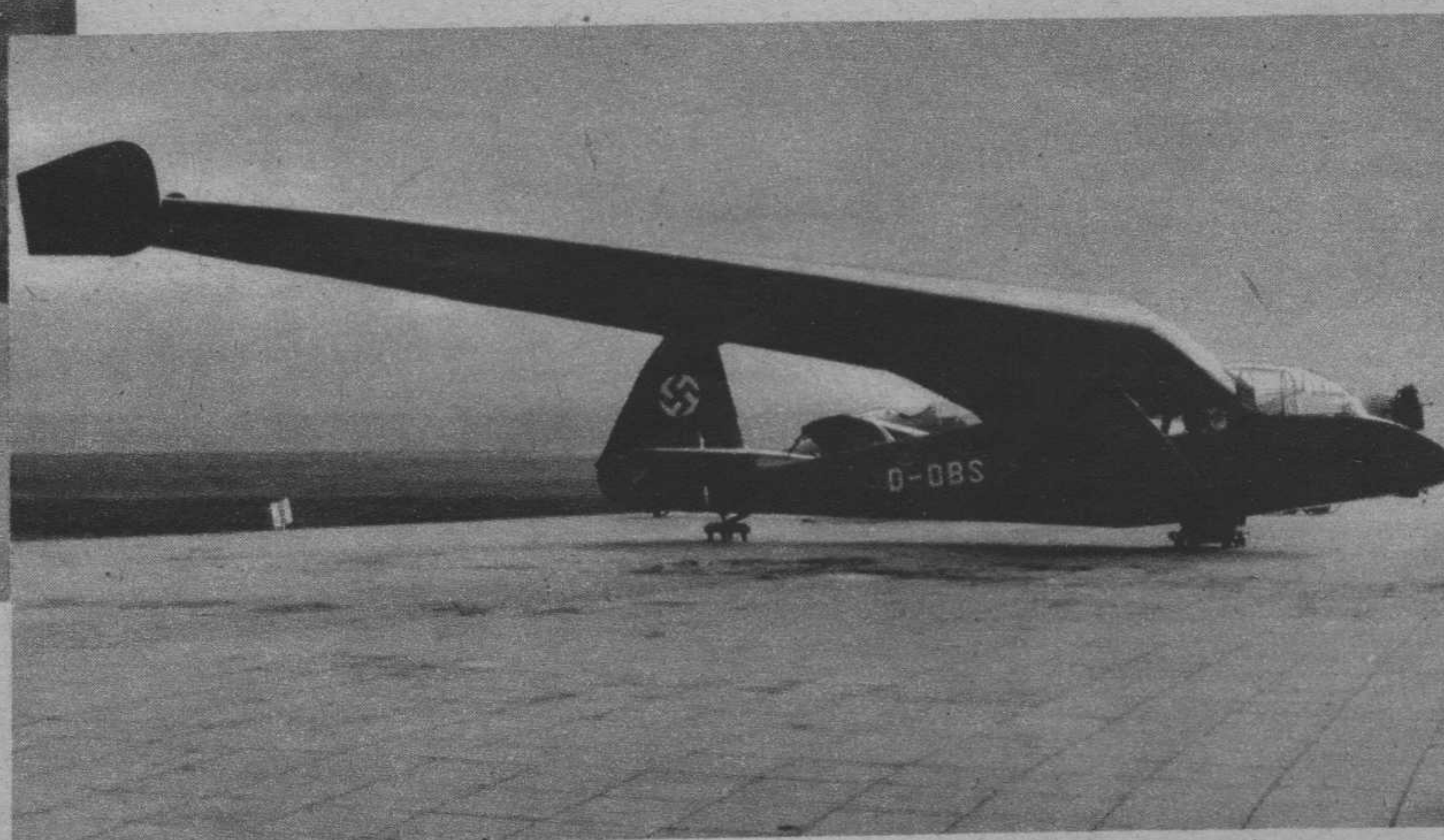
The greatest difficulty in blind flying is to keep control of direction. The pilot can feel the beginning of a turn, but if he continues turning he loses that feel, and when the turn stops he gets a false impression that he is turning in the opposite direction. The next difficulty in importance is controlling the

pitch. In a sailplane this has to be so accurate that it is difficult to avoid large changes in speed. The pitch is controlled by nosing the ship either down or up. Offering the least difficulty is control of the sailplane in a roll. Slight mistakes in that are not as important as errors in turn or pitch.

The instruments for blind flying on most of our sailplanes consist of a turn indicator, which has a needle showing the direction in which the turn is made; a bank indicator similar to a spirit level but equipped with a ball instead of a bubble, showing which wing is down; and an airspeed indicator—which does just that. These instruments are used systematically and in definite order when flying blind in straight flight. The pilot looks first at the turn indicator, and if the needle is not in the center he brings it back by a slight pressure on the opposite rudder pedal. Next he looks at his airspeed indicator, and if it registers more than normal cruising speed it means that the sailplane is diving, so he brings the stick gently back until the needle of the airspeed indicator shows him that he is back to normal cruising speed. Last of all he looks at the bank indicator and levels out the wings, moving his stick sidewise. This is known as the one-two-three system of blind flying. It is advisable, however, that in correcting his turn the pilot use both rudder and stick. A number of our pilots practice this method during distance flights by putting their heads (Turn to page 53)



Above—A gliding family! Helen Montgomery, holder of American woman's duration record, takes her two-months-old daughter and her husband for a ride at Frankfort, Mich. Right—This huge weather-observation glider, built in Germany, is equipped with all-important two-way radio phone.



BY the time this issue gets on the stands things may be different, but right now, war or no war, we are still getting our foreign aviation magazines as regularly as ever. *Flight*, the English publication, and *Flugsport*, which is German, arrive sometimes in the same mail, while across the water the very ships described in them are battling each other in grim reality. There has been, however, a noticeable lack of military-ship cutaway drawings in the last few issues.

★ ★ ★

It is always painful to spoil an illusion, particularly a popular one, but then air progress has made many changes in aërolegend, if we may coin a word. No longer, for instance, does the hero of aviation stories have to appear in whipcord riding breeches and boots, helmet and goggles and all the rest of the trappings. Likewise the test pilot has changed. According to the movie version and fiction, he is a hardy soul, prone to wrap his tummy with ten yards of tape, jauntily climb aboard a snorting experimental ship and then all but kill himself and crash-the plane trying to tear it apart. Tales of his screaming from pain and pressure in power dives, "blacking out" on split-S turns, and coming down (if he lives) a game though jittery hulk, have been the public's fare for years. Well, *sometimes* all that is true, but lately we've been discovering that test pilots are actually just human beings. They go to the movies if they find time, like music, have families, and testing ships to them is merely a job.

Take one famous test pilot who simply puts on a teddy suit over his business suit for warmth and goes ahead and tests. Or another who dove and pulled out an SBC-4 recently at a G load of 13½, suffering no more than a lame neck, when according to all fiction he should have been very, very dead. Incidentally, this same chap has seven children, so you see he's a real family man besides being one of the best in the business.

And a recent development in testing technique is the installation of dictaphones so that during the test dives the pilot may dictate his reactions rather than try to write them down. A movie camera also takes pictures of the instruments, recording their every bit of evidence. Pretty soft, eh?

★ ★ ★

Apparently anticipating foreign business in sizable chunks, Vultee have released their Valiant 51 (basic combat) for export. This splendid ship may soon be fighting overseas. It will be interesting to see how some of these American ships will act under actual combat. It should be very gratifying indeed to the Curtiss organization to hear from French authorities that the Curtiss 75-A has been more than holding its own on the Western Front. Reliable reports say this ship has been more than a match for the much-flaunted Messerschmitt 109s. This is particularly interesting when you consider that our later models of this same ship can outperform by a wide margin these same 75-As. We refer to the Curtiss P-40 of which we have ordered four hundred and then there are even later models such as the 42, which, while still experimental, are sensational.

★ ★ ★

Miami's All-American Air Maneuvers, Janu-

ary 5, 6, 7, 1940, seem to be the next thing on the air-show program. These annual affairs in the Southland, of which this is the twelfth, are rapidly developing into one of the most important events of the year. Ideal flying weather and real co-operation from the local authorities have gone a long way to make them so.

★ ★ ★

Vultee's United States army air corps contract for Valiant 54 basic trainers has been received in its approved form. These ships will carry the air corps designation BT-13. Hope that doesn't stand to be interpreted as Black Tomcat-13 by the superstitious.

★ ★ ★

It is interesting to hear that the army air corps is planning to take up gliding and soaring as a serious part of its training, and is looking around for a soaring site. Apparently after witnessing the soaring at Elmira, the air corps has the idea that only slope soaring is possible, while in fact slope soaring is decidedly passé. The army would be wise to investigate the broad Texas plains where thermal soaring is at its best, and where all you have to do to make a landing with plenty of room is to point the nose down and land. This is ideal for student training.

★ ★ ★

That soaring is rapidly coming into its own and is being enthusiastically followed and investigated by former skeptics was evidenced recently by an invitation for Lewin Barringer and our soaring editor, Alexis Dawydoff, to show their combined collection of soaring movies to a group of transport pilots and Q. B.s at Newark Airport. From what we hear the boys got a great hand, and the questions were hot and heavy.

★ ★ ★

The long-talked-of idea of carrying all first-class mail by air has been tried out by Great Britain with her empire mail for the colonies with almost terrifying results. For some time folks in this country have been trying to talk this up. Now perhaps they will relax for a moment and cogitate on what happened to the English, which was plenty. In the first place the mail was so heavy that even passengers had to be left behind, the companies involved were practically collapsed for lack of enough equipment, and it finally became so involved that it took longer for a letter to reach the colonies by air than it did by freight because of waiting for a chance to fly.

★ ★ ★

The gigantic new British airdrome being built at Botwood, Canada, is one of the most unusual airports in the world for several reasons. It is hacked out of the Canadian forest so far back from any cities that it is practically isolated. It is an entire city in itself, with movies, stores and all the trappings. Again, it is located at a certain point where because of peculiar weather conditions there is never any fog. This in itself is certainly worthy of note for it is important in year-round operation of huge transports and military ships.

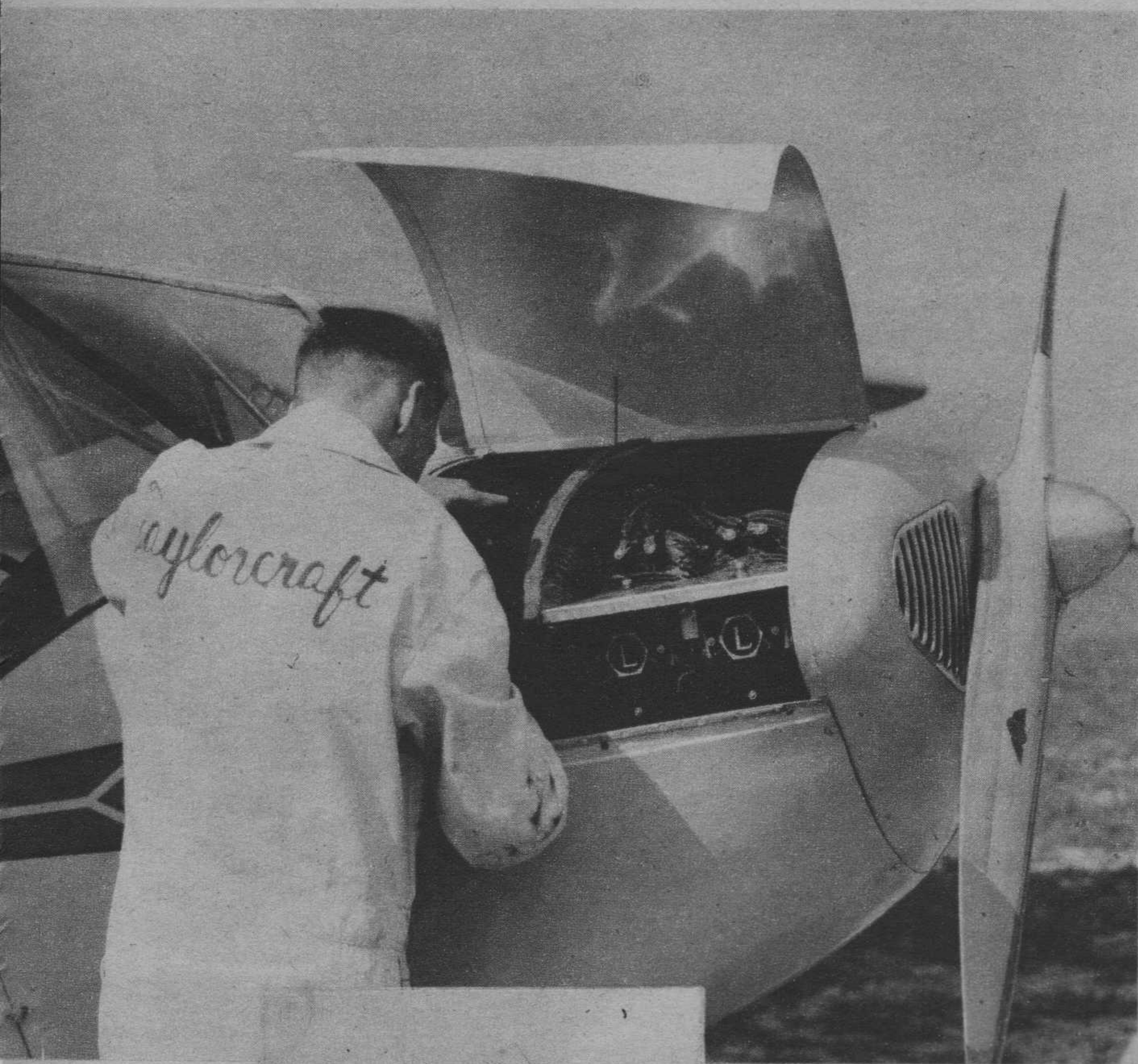
★ ★ ★

Another interesting Canadian fact is that the abundance of salt, which has been one of Canada's oldest products, makes possible its use for runways when combined with clay. At any rate this surface must be (Turn to page 55)



SUPERCHARGED SHOESTRINGS

How to buy a light plane though broke—
bright examples of courage and ingenuity.



The new auto-type cowling on the latest 1940 model Taylorcraft light plane. Left—Marvin Everett, who had a plan that worked. Below—The new all-metal Luscombe, an increasingly popular ship.

HORATIO ALGER had a formula in writing his stories. The poor newsboy with a widowed mother worked hard, finally married the boss' daughter, and lived happily ever after. He never bought an airplane because airplanes hadn't been invented. In a modern sequel he would.

Jimmie Cook is the modern sequel.

Jimmie was a newsboy. By all the rules, he'd be lucky to buy a Model T Ford with its top missing, its upholstery full of holes, its remaining fender flapping; but Jimmie wanted an airplane. It was a foolish ambition. Airplanes cost money. Maintenance is no joke. They need gas and oil, and hangar rent varies from five dollars to thirty dollars. The man the salesmen are gunning for is typically a merchant, a doctor, a business man who can count on a good income. A survey showed they thought \$1,500 a year a minimum income. "But, of course," they explained, "it all depends upon how much a man *wants* the airplane!"

Which explains Jimmie.

He took his troubles to various airports, priced the planes which three years ago ranged from \$1,200 up (a little less now), and carried his troubles home again. "I'm saving all I can," he said to Midge Ash, his girl friend, "but when it's only a few cents a day, it's pretty discouraging."

"How much do you have now?"

Jimmie brought out his hoard. They looked miserably at the little pile. An airliner, the night mail from Newark, thrummed overhead and Jimmie walked to the window to watch its green and red and white lights trace enchantment across the purple sky. Midge looked past his shoulder, then at the resolution in his face. She smiled suddenly. "We can do it, Jimmie. Look—"

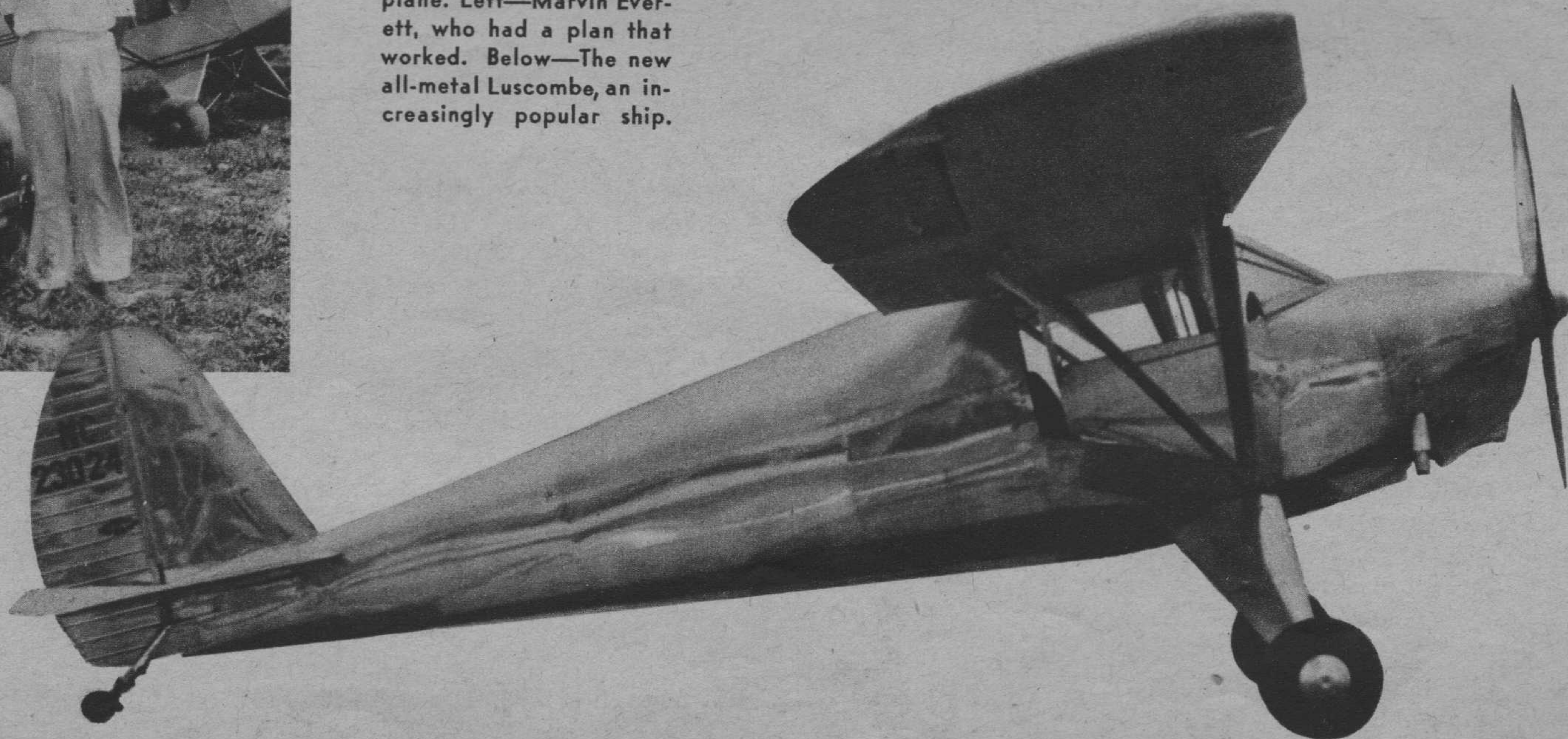
Midge helped a lot. Their dates didn't cost much, because Midge loves airplanes as much as Jimmie does. Day by day the pile grew. It was slow, but when one evening the score tallied 40,000 pennies, they looked at each other in triumph.

All night he and Midge wrapped pennies in the little paper rolls that banks demand when pennies are turned in. All day, sleepy but excited, they wrapped. At dinnertime they had finished. As soon as the bank opened next morning, Jimmie was there trading pennies to a goggle-eyed cashier for \$400. At Central Jersey Airport, he took the money to Al Bennett of Bennett Air Service.

"A down payment on the cheapest new ship I have is \$419," Al said, "and monthly payments, including insurance and finance charges, will be ninety-three dollars a month."

Jimmie looked sick. "But I can find you a (Turn to page 44)

BY ALMA HEFLIN





Kitty Hawk Wright Memorial.

KITTY HAWK—

WHERE MAN FIRST FLEW

BY FRANK A. MONTGOMERY JR.

SOUTHWARD from the Virginia capes there lies along the stormy shores of the Atlantic a region of windswept sand and narrow beaches of wild, forbidding aspect. For over one hundred and fifty miles below the Virginia line this lonely shore forms the easternmost rampart of the North Carolina mainland.

Into this barren region, in the summer of 1900, near the little village of Kitty Hawk, North Carolina, there came two brothers from Dayton, Ohio, Wilbur and Orville Wright. And here, near a giant sand dune called Kill Devil Hill, within a stone's throw of the turbulent surf of the ocean, less than three years later there occurred one of the most far-reaching events in the annals of the world: the birth of the airplane. To mark this great feat, there stands today upon the crest of the sand dune, Kill Devil Hill, an imposing granite memorial to those intrepid brothers, a memorial to mark forever the spot where man first flew.

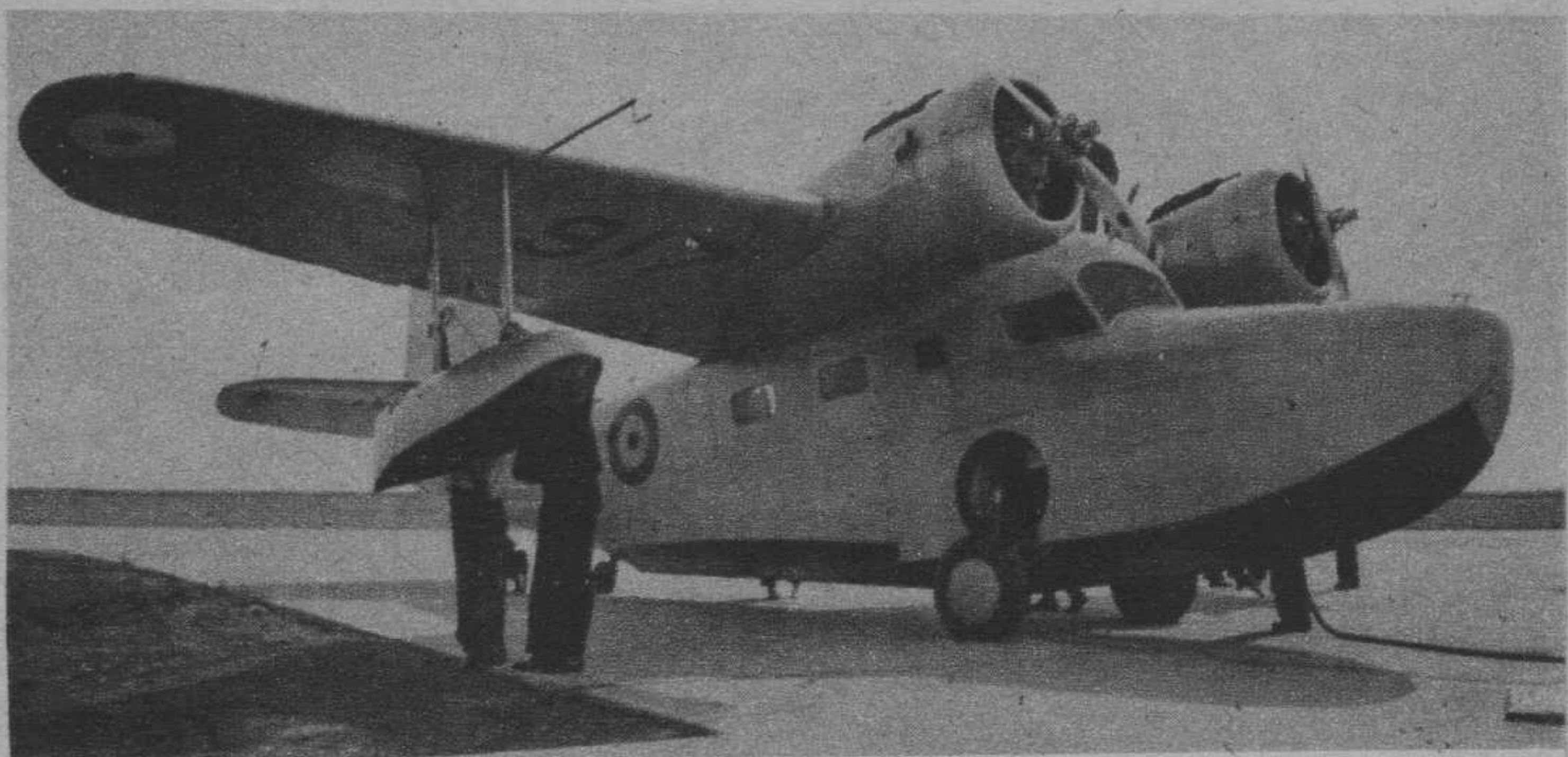
The beginning of the work that reached its successful culmination on the sands of an isolated North Carolina beach really took place in Dayton, for in that city the two Wrights were born and grew to maturity. It was there, too, as boys, and later as young men in their bicycle shop, that many of their earlier experiments connected with flights were carried on. In fact, for years before going to North Carolina the Wrights performed endless experiments with gliders and model airplanes, and the true foundation for their later work at Kill Devil Hill, near Kitty Hawk, was laid there.

The story of the first flight of an airplane really begins when the Wrights, as lads, received as a present from their father a toy helicopter. That was in 1878. When the helicopter was held in the hand and released, instead of dropping to the floor it flew across the room. Understandably fascinated, the boys immediately took time out and built larger ones, making them fly, too. But it was not so very long before they found out that the larger the helicopter, the less it flew, although it was a long time afterward before they learned why—a machine having twice the linear dimensions of another would require eight times the power.

This crude toy undoubtedly aroused the interest of the Wright boys in flying, but it was not until about 1896, at the time of Lilienthal's death in his glider, that they really began to consider the problem of flight. As both of the Wrights have said, they, at that time, began to read every piece of literature on manmade flights that they could lay their hands upon.

Profiting by what they learned through reading of the work of others, Wilbur and Orville early decided that instead of trying to construct a glider which of itself would hold a perfect balance in the air, they would build one that wouldn't tend to right itself at all: they would make it as inert as possible, you might say, and then apply to it some method by which the operator could regulate its balance at will. This brought them, in time, naturally enough, to the matter of control, which they solved in their characteristic manner by inventing the warping wing, forerunner of ailerons on modern wing surfaces. Also (Turn to page 46)

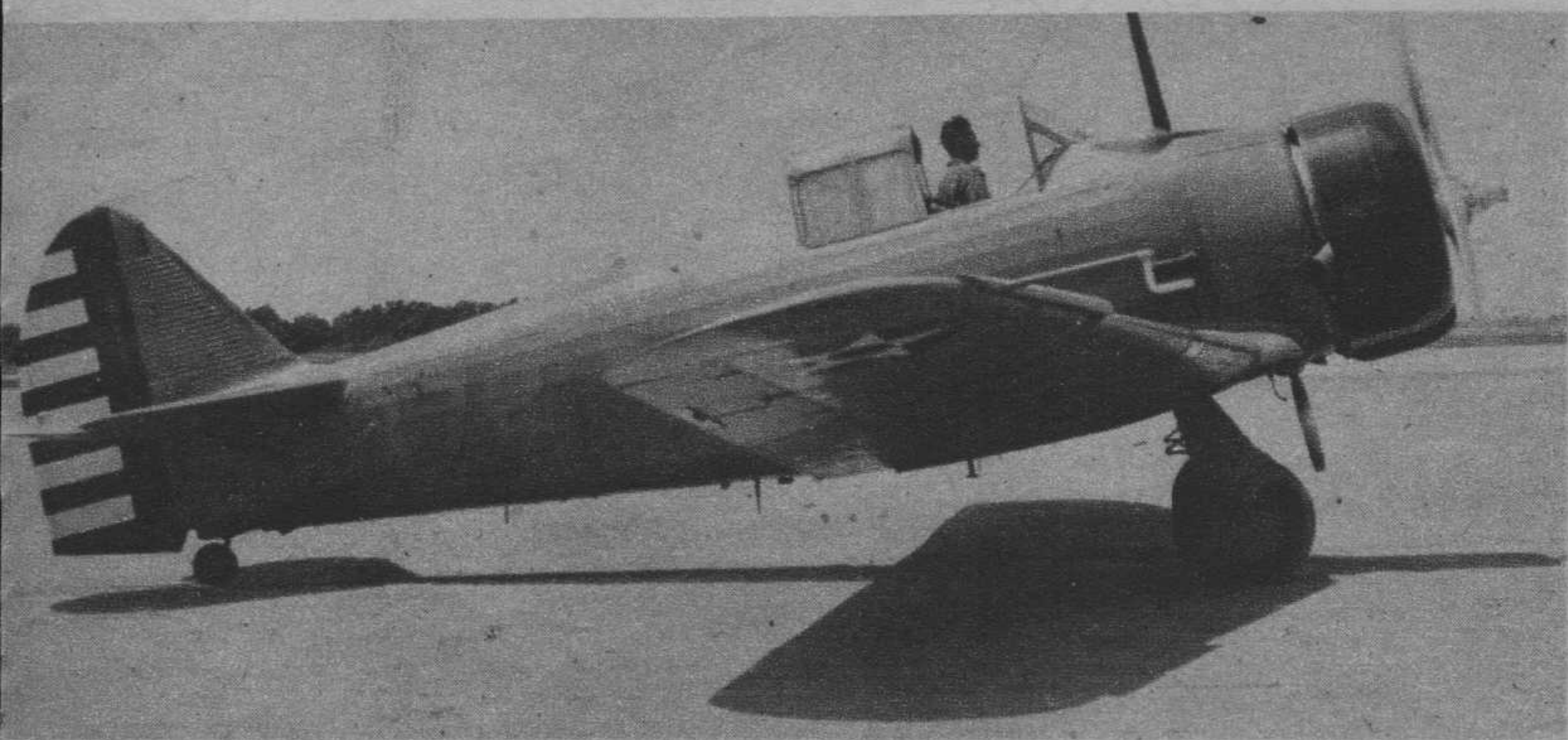
This month marks the anniversary of the airplane's birth, ever an engrossing story.



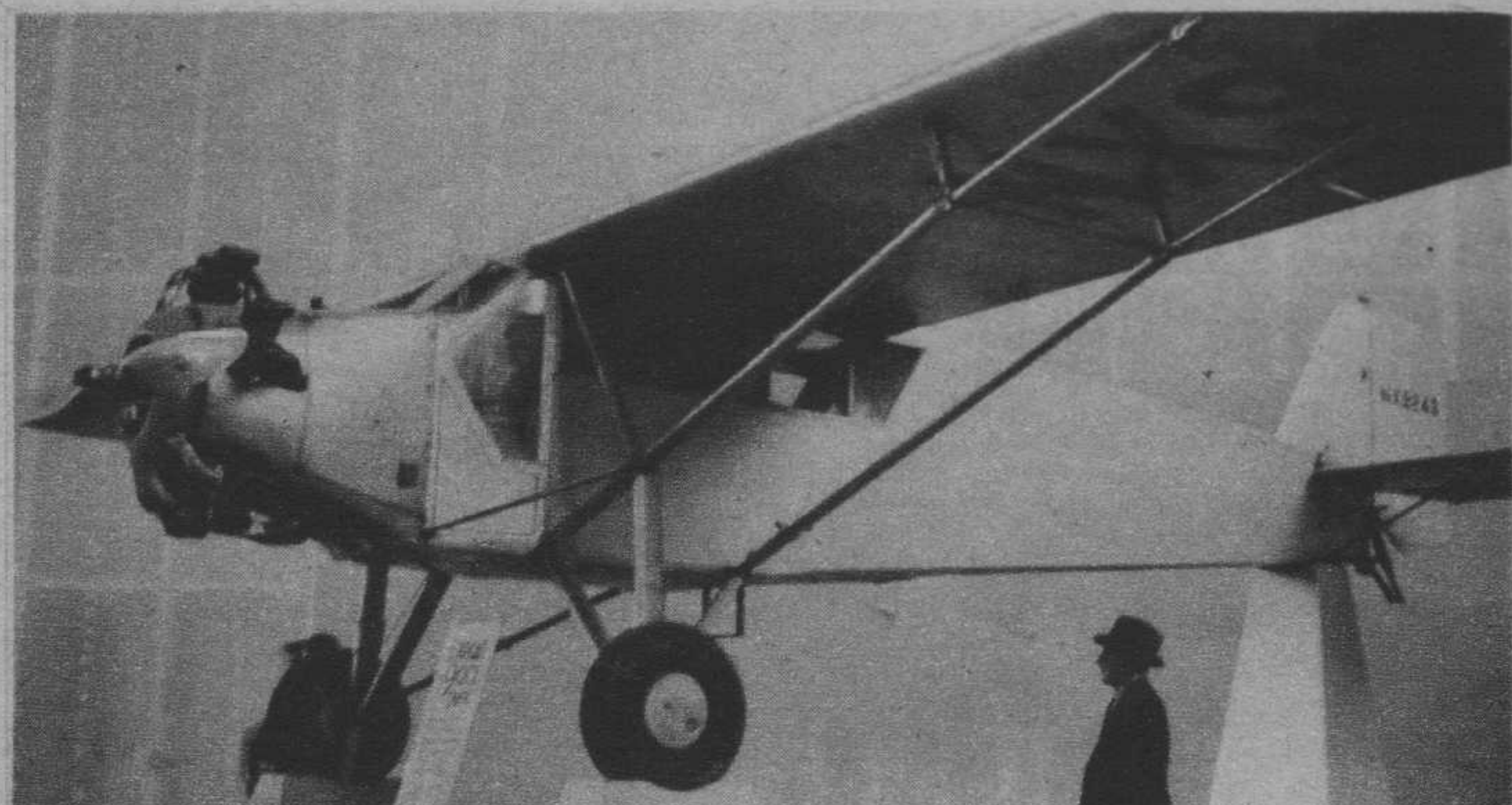
Howard Holliday, of Regina, Sask., sends in this fine shot of R. C. A. F. Grumman.



Cold in the nose? Charles Esler of Marion, Ind., snapped this N. A. O-47A.



And another North American! This BC-1 was snapped and sent in by Air Adventurer Russell Scott, of Dallas, Texas.



All dressed up. "Corrigan's Clipper" as it looks at the Frisco Fair. Charles Peterson, of Cakota, Minn., sent it in.



Actual size of your Air Adventurers pin.

(MEMBERSHIP COUPON)

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

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

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

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

Address.....

☐ Check here if interested in model building.



Air Adventurers, a neutral meeting place.

GREETINGS, Air Adventurers!

Your Flight Commander is in a very unenviable position these days attempting to greet both American members and our loyal overseas friends. As you all know, this grand organization of ours is composed of aviation enthusiasts all over the world. We have no specific requirements as to nationality, but are all bound together regardless of race or creed through the support and principles of the Air Adventurers Club, which is only interested in the advance of aviation.

Many of our members are Canadians, Australians and Britons, and they naturally are keenly and vitally interested in the new world war their empire is at present waging with the Nazi German government. We can feel for them and all have our personal opinions in the matter, but owing to the official stand of the United States to remain neutral, we cannot allow this department to take up any particular stand in the great conflict. We are of course intensely interested in the possible outcome, and as aviation enthusiasts it is natural we show more than passing interest in the aviation development and the air-war action. Yet as neutrals it does not become us to air personal opinions in the pages of this department.

Your Flight Commander, then, takes this opportunity of attempting to clarify our position in this matter, both for our American members and those who reside across the border or overseas. We hope that all members when writing to this department will fully recognize and understand our position. We hope to hear from our British Empire friends just as we have in the past, and we want news about themselves and what they are doing. We are sure, however, that in their reports they will respect the state of neutrality which our government has decided upon.

Nor do we think it necessary to remind our American members that as Americans they are neutrals and should conduct themselves as such. Let us aim to keep Air Adventurers a world-wide meeting place for all who are sincere in their desire to further the progress of aviation.

Your Flight Commander,

ALBERT J. CARLSON.

CLUB NEWS

And now to the happier side of our department. The mail bag bulges with news this month, Air Adventurers!

First out of the bag comes from far-away Australia. We have a new Aussie member, T. E. Matthews of Adelaide, who boosts Australian commercial aviation to the sky. And he says they have a lot of American Douglas and Lockheed Electras down there now, since most of the British firms are too busy building military planes to get into the export commercial market. Matthews is an interested model builder, too, having completed a Grumman XFS-2. He is now building a Flying Fortress, a DC-4, and the new Boeing 314 flying boat. Quite an undertaking, we'd say, but that's how the Aussies do things.

All the way from Puerto Rico, Hector U. Benny sends in two swell photographs of military types used down there. One is a Consolidated PBV-1 drawn up on the apron, and the other a Sikorsky S-43 amphibian. Lots of swell detail, too. We wonder how long we shall be able to get military pictures of this kind.

(Turn to page 66)



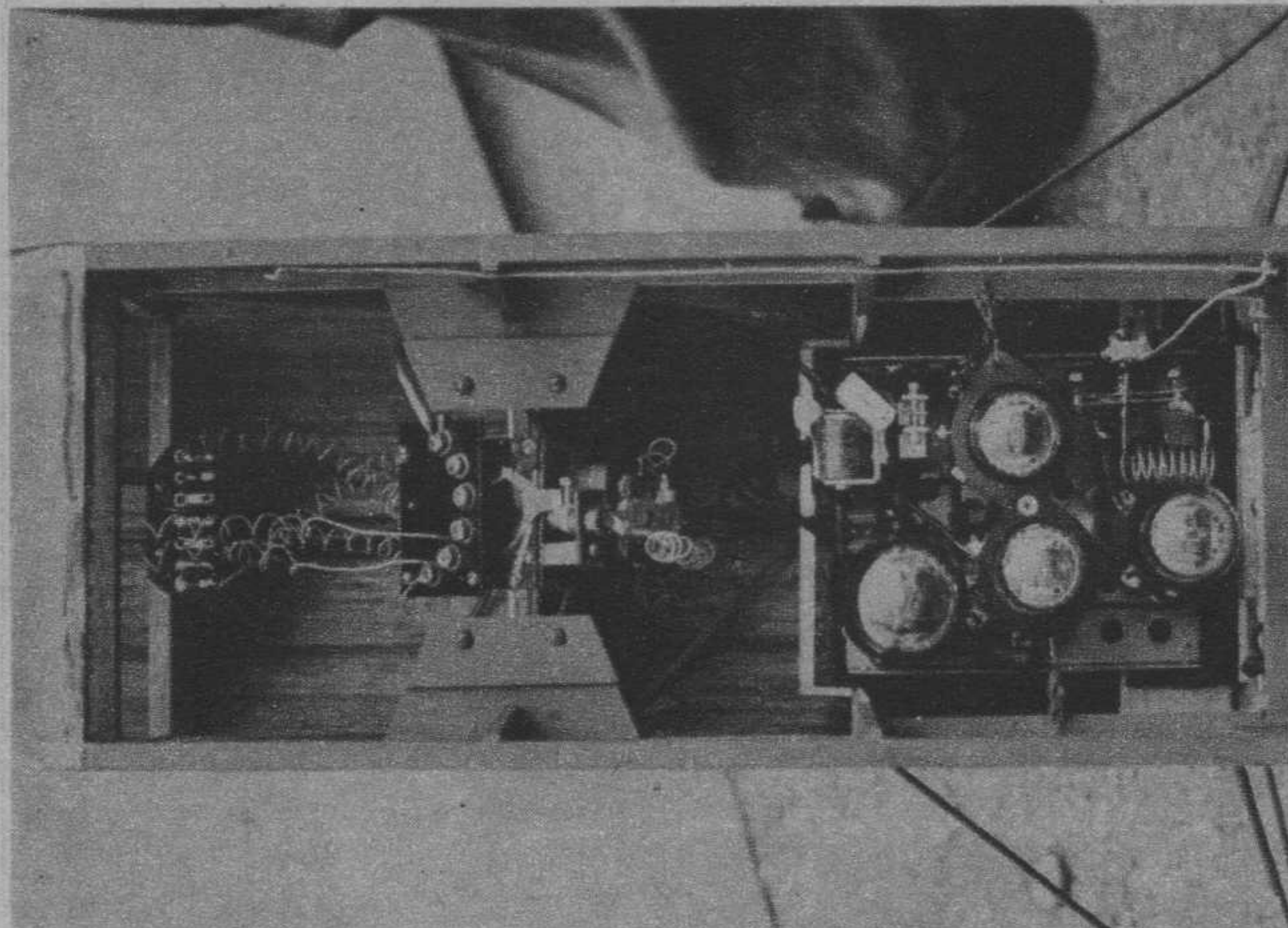
MODEL PLANE

OBEYS RADIO

This latest wrinkle is of international use for antiaircraft gunnery practice.



Left—This successful model was built by Joe Raspante, of Brooklyn, N. Y., here shown testing four-tube receiving set. Heavy-duty batteries are used for testing to preserve the plane's own, smaller batteries.



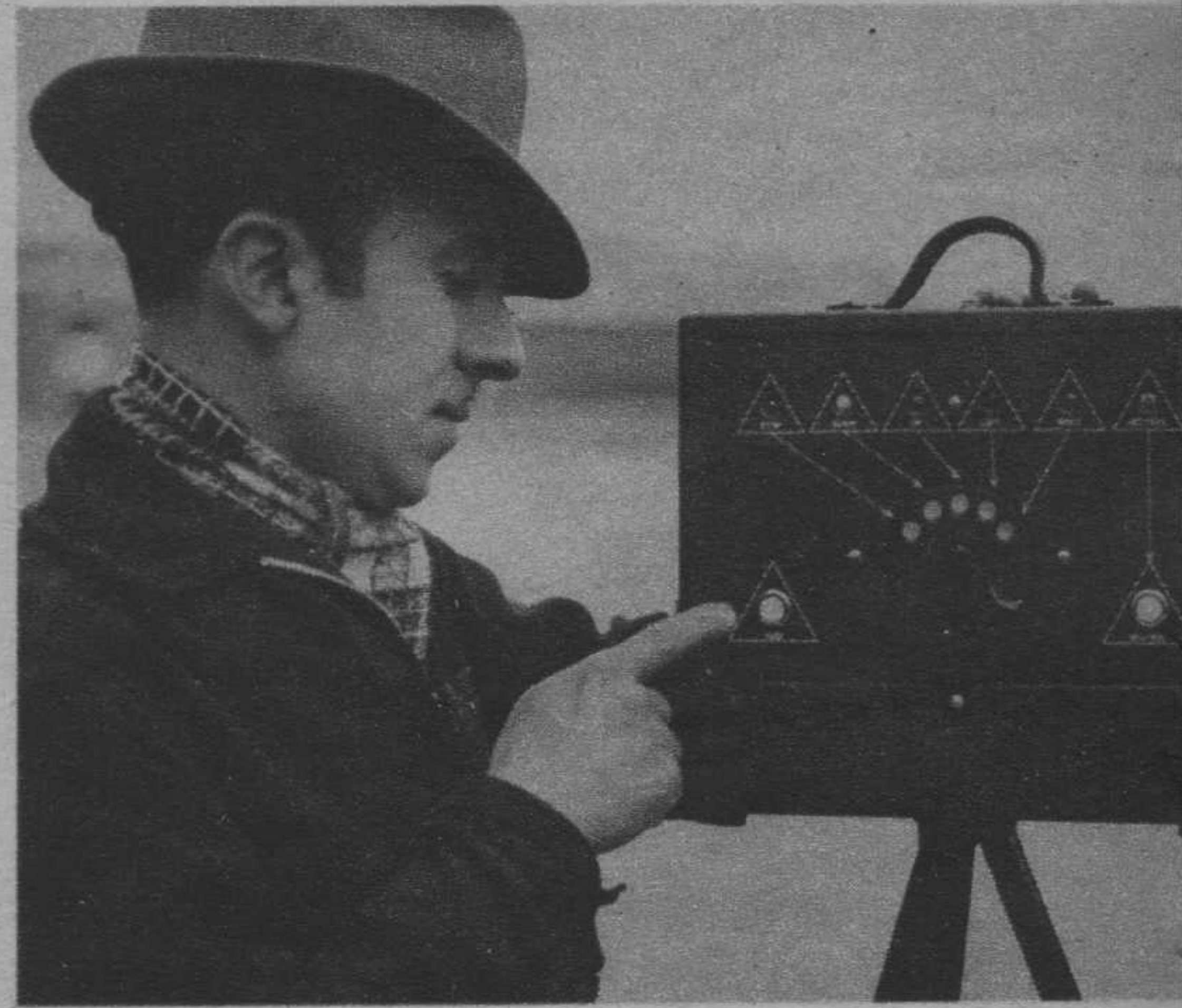
Middle—Close-up of receiver and selector units. The receiving set weighs 15 ounces. Right—Tuning the receiver to the 5-meter ground transmitter. A bakelite screw driver is used to adjust the condensers.



Left—The detachable tail assembly is provided with control wires, coordinated with the selector unit mounted in nose of ship. Engine and rudder controls are all that are necessary to control the plane.



Middle—These batteries energize the magnets that control ship. Right—Ground-control selector enables operator to choose maneuver desired. The telephone-dial arrangement actuates six different maneuvers.



Setting up the control units. Transmitter is in the center, ground-control selector right. Latter does the actual controlling.



QUESTION: Would you kindly send me a list of all the standard ships in the air corps of the following classes: bombardment, attack, pursuit, fighter, observation and others? Where could I obtain pictures of these ships? R. W. O., Cambridge, Mass.

Answer: Sorry, but space does not permit us to list all the types of ships in the air corps. For photographs write to the Chief of Air Corps, Washington, D. C.

Question: Where can I get plans for a plane that is cheap to build? What are the five fastest pursuit planes in the world? M. J. S., Gerard, O.

Answer: For such plans write to Heath Airplane Co., Benton Harbor, Mich. With all countries designing and building new models of pursuit planes constantly, it is hard to say which are the fastest. Germany has Messerschmitts and Heinkels, England Hawker Hurricanes and Supermarine Spitfires. We have the Bell XP-39, Seversky P-35, and XP-41, Curtiss YP-40. France has the Morane and the Dewoitine.

Question: Could you tell me if a pilot can get a transport license if he has to wear glasses to bring his vision up to normal? C. H., Dallas, Tex.

Answer: If your vision in either or both eyes is not poorer than 20/50 and can be brought up to normal, which is 20/20, with glasses, you may be qualified for a commercial license provided that glasses are worn while piloting the aircraft.

Question: What are the requirements necessary to hold a position as a radio dispatcher for an air line? How much salary does he receive? What are the chances of getting a job? J. S., Memphis, Tenn.

Answer: For requirements about this job write to the Civil Aeronautics Authority, Washington, D. C. It is a very difficult job to obtain as requirements are very strict and the applicant has to have served as a first or second pilot for a certificated air line for at least one year previous to application for dispatcher's position.

Question: Will you kindly tell me the minimum educational and aeronautical requirements for a commercial license? G. T., Chicago, Ill.

Answer: The applicant for a commercial license shall be able to read, speak, write and understand English. The aeronautical requirements are two hundred hours of solo flight, of which the last five hours were logged within the last sixty days; ten hours of solo cross-country flight which shall include at least one flight of not less than one hundred miles with at least three full-stop landings at different points on such course.

Question: Could you tell me which is the faster and more maneuverable plane, the Grumman XF4F-4 or the Curtiss YP-37? E. L., Manchester, Okla.

Answer: Sorry, but no information is available as to the performance of these two ships.

Question: I am a young colored fellow and am aeronautically inclined. I contemplate entering the design branch of aeronautics after going through some technical school. Is a great knowledge of mathematics necessary for this phase of work? What would be my chances of securing a position with an aircraft concern upon completion of school? J. W., Jr., Salt Lake City, Utah.

Answer: Mathematics and physics are most important in design work. If you show promise at the time of finishing the engineering school, you doubtless will have no trouble in securing a position in the design department of some aircraft manufacturing concern.

Question: What is meant when an airplane propeller is fully feathered? What does 10G mean in connection with a power dive? What is the apron of a landing field? G. S., Warren, Pa.

Answer: When an airplane propeller is fully feathered its blade is at an angle of approximately 80 degrees to its flat-pitch position. 10G is the force exerted on the plane in a pull-out from a terminal-velocity dive, which is ten times greater than the normal pull of gravity. G is the symbol of gravity, and 10 indicates the power to which it is raised. An apron is a concrete strip in front of the hangars on which airplanes are parked.

Question: Where can I secure full information concerning the requirements necessary to become an air stewardess? M. E., Franklin, Pa.

Answer: The applicant for that job has to be single, a registered nurse and a high-school graduate. She must be not more than 5 feet, 5 inches tall and weigh between 100 and 120 pounds and be in perfect health.

Question: I would like to get some information on the M. U. A. L. apprentice plan for entering aviation. Is this a reliable method for a young man to start with? What are the qualifications and the usual pay? How long will it take to get a license this way? W. E. H., Thomaston, La.

Answer: I suggest that you write to the M. U. A. L. regarding their apprentice plan. It sounds good and ought to give you a right start in aviation. According to the Air Line Mechanics Association wage scale, the apprentice receives 42 cents per hour for a period of six months with a subsequent increase of 2 cents per hour each following six months. After two years, when they reach their maximum of 48 cents per hour, they are promoted to junior mechanics. A number of organizations which do not belong to the A. L. M. A. pay less. Apprentices must be at least 16 years old. You can get your license whenever you pass your written test, provided you are over 18 years of age and have had at least one year of practical experience.

Question: Will you please send me a list of the ten best universities or colleges teaching aeronautical engineering? J. C. M., Jr., Jackson, Miss.

Answer: Write to the Civil Aeronautical Authority, Washington, D. C., for a list of these institutions.

WHAT'S YOUR QUESTION

This department will attempt to answer any questions concerning aviation. Those of general interest will appear on this page; others will be answered by mail. Inclose a three-cent stamp to insure a reply. ★ All inquiries regarding appointments for U. S. army air corps flight training should be addressed to the Adjutant General of the Army, Washington, D. C. Those concerning application for naval aviation training should be addressed to U. S. Navy Bureau of Navigation, Washington, D. C. ★ Persons interested in applying for air corps ground training, such as that for airplane and engine mechanics, riggers, instrument and radio men, as well as aerial photography and parachute work, should address the Commandant, Aircraft Technical School, Rantoul, Ill.

MODEL BUILDING

A I R T R A I L S M A G A Z I N E

Trophy-winning contest models • High-performance gas jobs

Informative articles by experts • Interesting photographs

D E C E M B E R

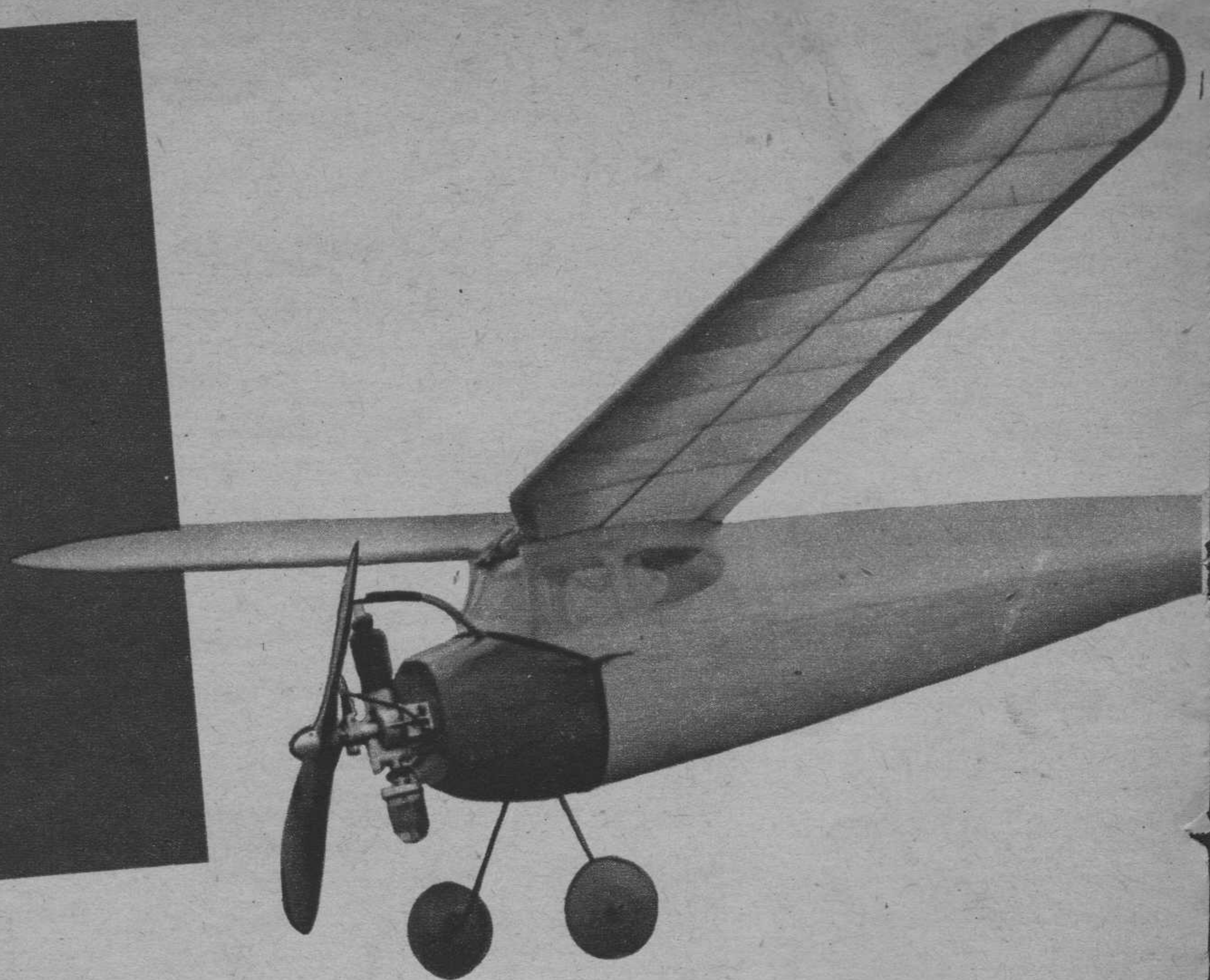
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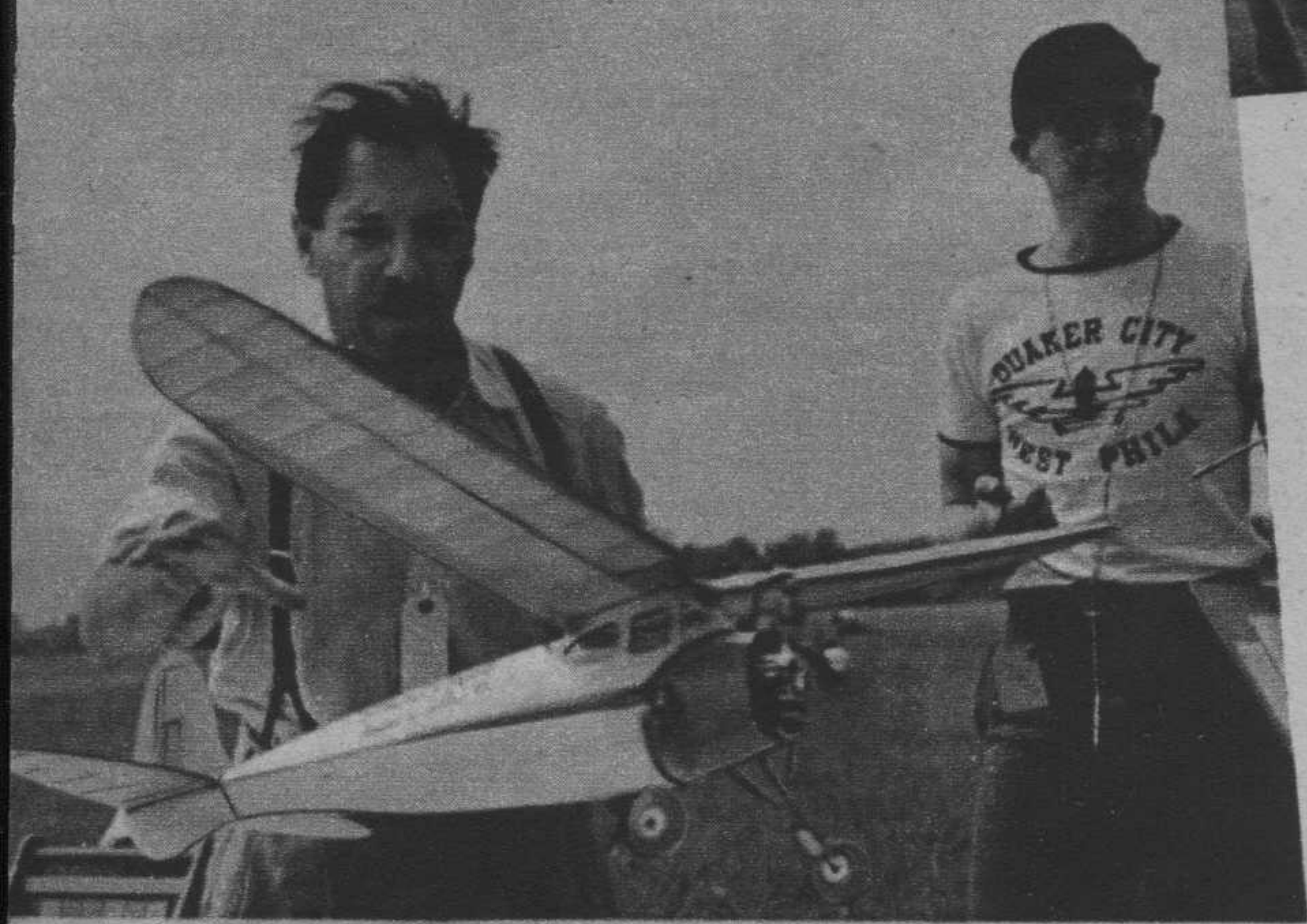
Frank Nekimken with one of his classes organized by Chicago Park District. Many groups now recognize value of proper instruction for beginners.

THE MOLECULE

BY LOUIS GARAMI



Above—Garami and the Molecule. Left—Start of the record flight at Hadley Field, where the Molecule outflow larger ships. The monocoque fuselage and wing installation are points to note. Nose detaches.



WITH the advent of improved tiny engines, Class A gas models are coming into their own in aëromodeling. As with everything in life, competition results in improved products for the ultimate benefit of the consumers—that's us, the model builders.

Having used many engines, the writer has found much satisfaction with the Atom, the smallest and lightest production engine. The Molecule was designed specifically for this super-light engine, and this accounts for the low total weight of twelve ounces.

At the official Eastern States Gas Model Championship the ship proved itself by spectacular performance. By winning first place and setting a sensational record, the ship lifted Class A modeling to a new level and gave it the respectability and recognition on par with other classes of powered model flying. It wrote finish to flights of a few seconds that were predominant hitherto.

The influence of this method of sheet balsa monocoque construction is being felt in all modeling circles. Several commercial models have adopted this system, and the Molecule is the latest example employing several new wrinkles.

While the engine used is responsible for a greater rate of

climb, the inherent characteristics of the Molecule make possible the flat glide and soaring ability.

BODY

Make the lower half of the body first. Study the top view and fuselage detail and assemble the two longerons with all the cross braces. Although the plan does not show a cross brace at the very front, cement one in to bring the total width up to $2\frac{5}{8}$ ". This will be removed when the body is completed.

Cut out the two blanks, pin them together and sandpaper to uniformity. Look over the two curves and see that there are no wavy or uneven sections left in the outline. Shape two of each of all the formers out of $\frac{1}{8}$ " sheet balsa.

Now lay the two blanks down so that the underslung rudders "toe" together, and brush clear dope on the entire surface up to the point where the rudders begin. Make sure that the dope covers evenly. A second coat is applied after ten minutes.

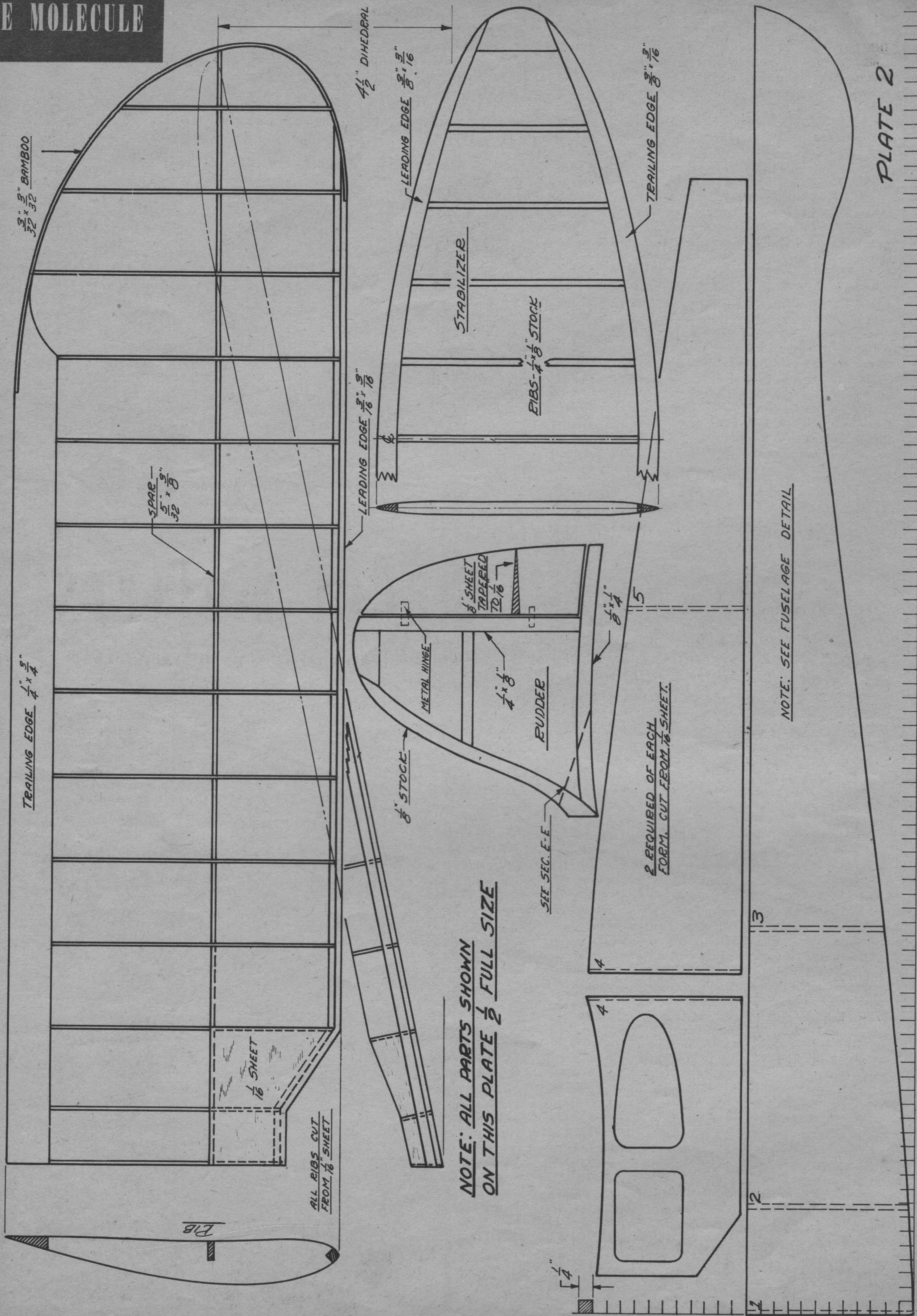
From this time on the two blanks will slowly curl up. The longer the drying period the more curve will be acquired. Experiments showed that this gradual warping will go on for days and days if it is not stopped. Our purpose is to get only a sufficient curve to fit the formers, so when the curvature is slightly less than Former 1, glue and pin in this part and follow up with 2 and 3.

Never dope a pair of blanks before you are about to take part in a long game of checkers, unless you expect to see a balsa pretzel when you get back to your model. In fact you should not stop working until the whole lower half is completed.

Now take the two blanks and cement them to the side of the longeron assembly. Use plenty of pins and do not forget that the longeron is only halfway in ($\frac{1}{16}$ "); the other half sticks out to accommodate the top half of the body. Next pull the bottom seam together. Although you may be able to do it with pins, we strongly recommend the use of cellulose tape for a perfect job. About ten 3"-long pieces will hold the seam together. Cement on the *inside* of the body, except the rudder part, which is cemented on the outside.

Use this same method in creating the top half of the body. Naturally this seam is very hard to cement on the inside, so we will do it on the outside. On any outside cementing be very careful not to spill cement on the surface—and use it sparingly so as not to spoil the appearance of the body.

Build up the cabin roof out of $\frac{1}{8}$ " balsa. (Three pieces—the two sides and a front cross piece.) Cut out the tilted former in front of the cabin, which is the same as two No. 1 formers in one piece. Pin and cement this former at the same angle as shown. Notch in the body top behind the cabin roof about $\frac{1}{4}$ " deep and cement the roof into place. Now fasten the three cabin struts, paying special attention to the line-up of the roof from every direction. The cabin blanks need only one coat of dope, since the bulge at this point is very little. (Turn to page 54)



THE DOPE CAN. (By Gordon S. Light.) Need we remind you to give model material foremost position on your Christmas list when you compile that worthy document? Give the bewhiskered gentleman the lowdown on what items you need to complete your equipment. . . . Gas Modeler Maxwell Bassett has gone big-time. He started at Glenn L. Martin Co. in Baltimore in September—graduated from University of Pennsylvania last June with a degree in engineering. He's still mighty interested in the model hobby. . . . Cold weather will soon drive all but the hardiest modelers inside. But the boys who continue winding them up throughout the winter prove their ability to take it. Is there anything more painful than having your cold-numbed finger clipped by a gas prop? . . . The latest information about the annual fall meeting of the Academy of Model Aeronautics is that it will be held the week end following Thanksgiving, November 25th and 26th, at Langley Field, Virginia, under the sponsorship of the Virginia Model Association.

While in Philadelphia for the annual Q. C. G. M. A. meet, we had a nice talk with Norman Bean and a close inspection of his latest radio-control model. Dead batteries prevented his giving demonstration flights at the contest. His model is small (six-foot span and five pounds total weight) and readily flown in any field large enough for a gas model. The transmitter is portable—readily carried by the operator, who is then free to move around and follow the model. Control at present is limited to the rudder. But a method of throttle control has been practically completed. Both controls are handled through a single channel. Bean has promised an article on radio control for our favorite aviation magazine. He is especially well-qualified—takes time out from model building to hold a very responsible position with Philco Radio and Television Co. Included in his work of development of radio for aircraft was the design and construction of the portable transmitter



Winners of the grand contest of the National Aero Reserve in Rochester. The N. A. R. was organized by Gannett papers.

used by the late Clem Sohn some years ago in describing his sensations during a twelve-thousand-foot delayed parachute drop during the air maneuvers at Miami.

Prospects seemed quite bright for us during the summer months. Alas, our luck failed again and we're continuing to work for a living. Our hopes were based on chances we took on a Cub coupe given away by a Baltimore fire company, a dozen automobiles by the Detroit Fire Department, a gas model at the Galt (Ontario) contest and a gas motor at the Philadelphia contest. One by one we waste-basketed the stubs as the drawings were made and the mail failed to bring us the good news. . . . Model Airplane Club meetings over Station WOR, Newark, are broadcast every Saturday morning at ten thirty. There's always a short talk on some phase of construction along with a question-and-answer period. Jimmy Condon has been giving out sound advice in his short talks. He's followed the hobby closely and his advice is well worth considering.

Air Youth of America is a new national organization designed to encourage and promote junior aeronautical activity throughout the country. It is headed by Winthrop Rockefeller, and has an impressive list of aviation personages on the governing council. A thorough survey conducted by A. Y. A. revealed there are close to two million boys and girls actively engaged in model building. The new organization is planned to co-ordinate and encourage aeronautical activity. Reduction of juvenile delinquency was pointed out as one of the chief advantages of promoting a worth-while hobby for youngsters to follow. The work of the model-minded city of Wichita can be held up as a perfect example of such constructive work. Here's a sample of their work: Boys who have come to the attention of the Wichita police are invited to attend classes in model building. They meet in the police station and are driven in cars to the clubhouse on the Arkansas River in the northern section of the city. The clubhouse is large enough for seventy-five students and instructors. It was donated by the Parks Department. Instruction is given from two to five p. m., with time out for ball (Turn to page 50)



Above—Scale model of a Martin B-10B, by Roger Parkhill, Nichols Field, P. I. Left—Tom Peerey, Fulton, Ky., and Wakefield contender, from March, '39, issue.

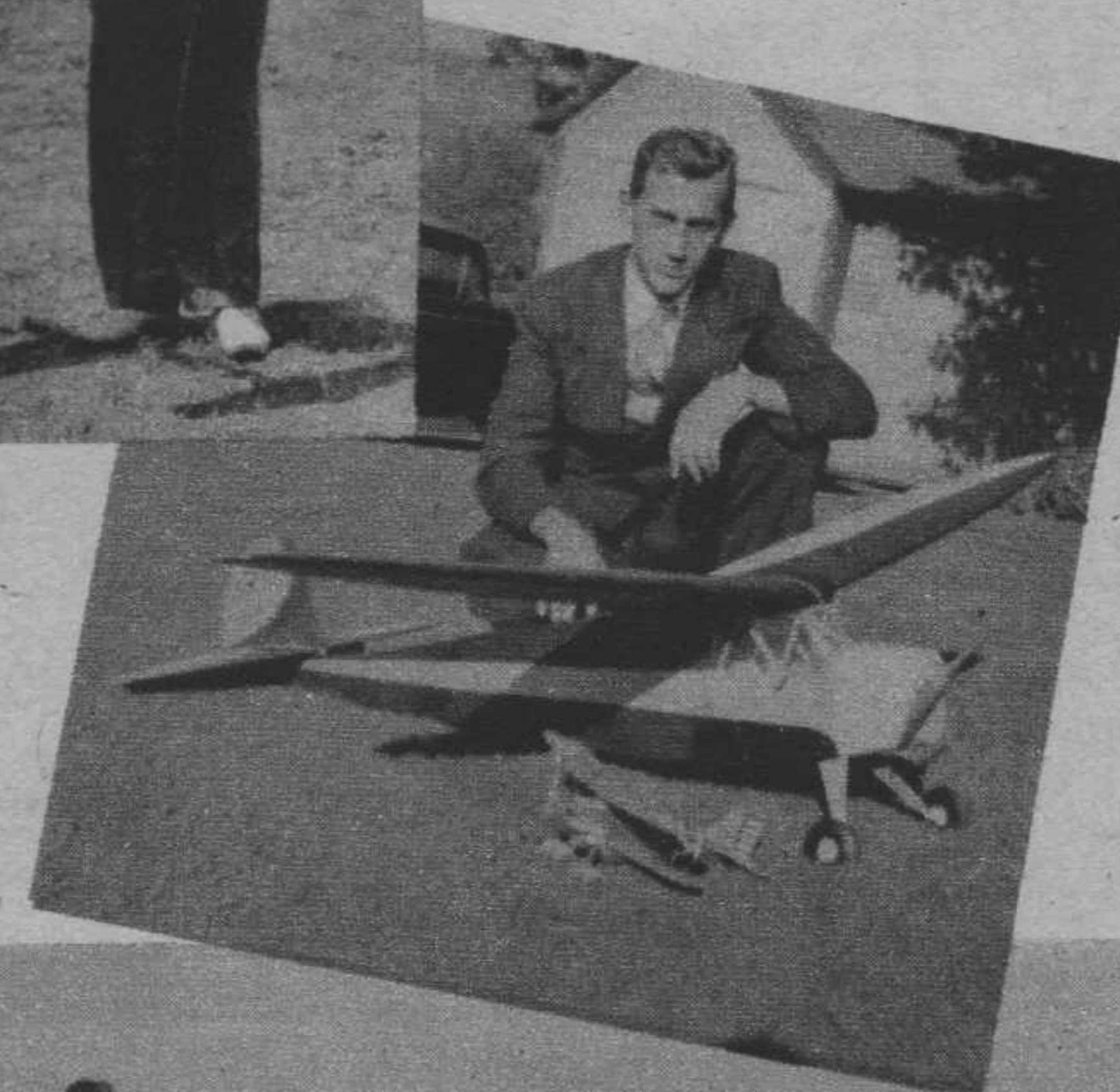
Right—Hewitt Phillips, United Aircraft.

model matters

Send in your photos, dope on your models.



Left—Dewey Bonbrake, Houston, set an N. A. A. three-flight average of 22:33. Below—from Scalp Level, Pa., M. Markovich and Comet Clipper.



Left to right—J. C. Williams, Bud Warren, Danner Bunch, and H. Broughton, prominent Coast builders.