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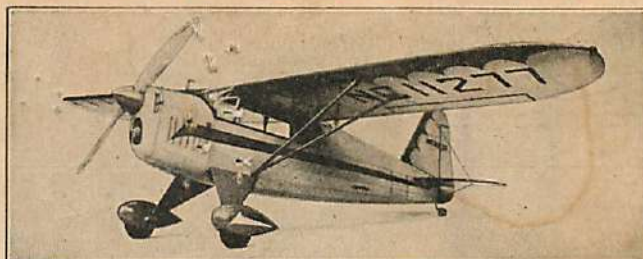
OCTOBER 1938

GUEST EDITORIAL BY JACK KNIGHT
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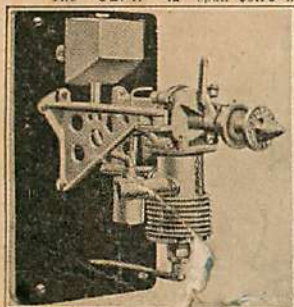
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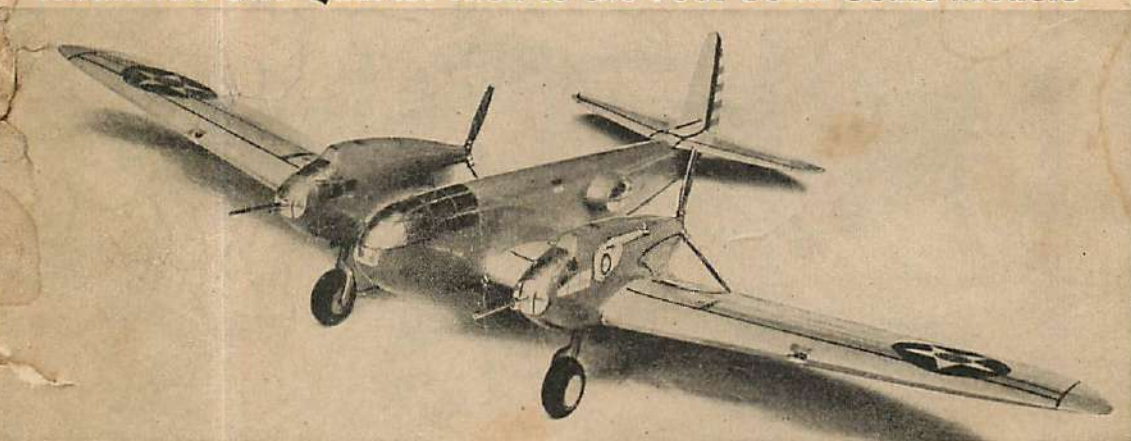
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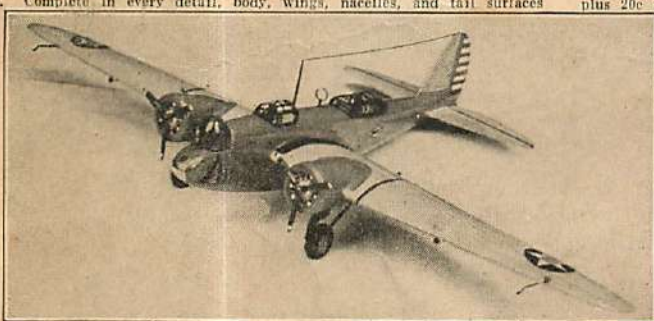
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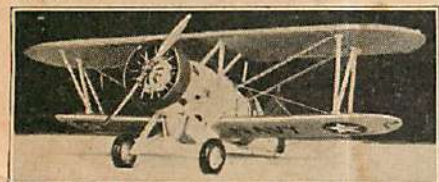
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THANKS BILL. HINTON CERTAINLY KNOWS HIS STUFF. I'M TAKING FLYING LESSONS NOW. I'LL SOLO NEXT WEEK.

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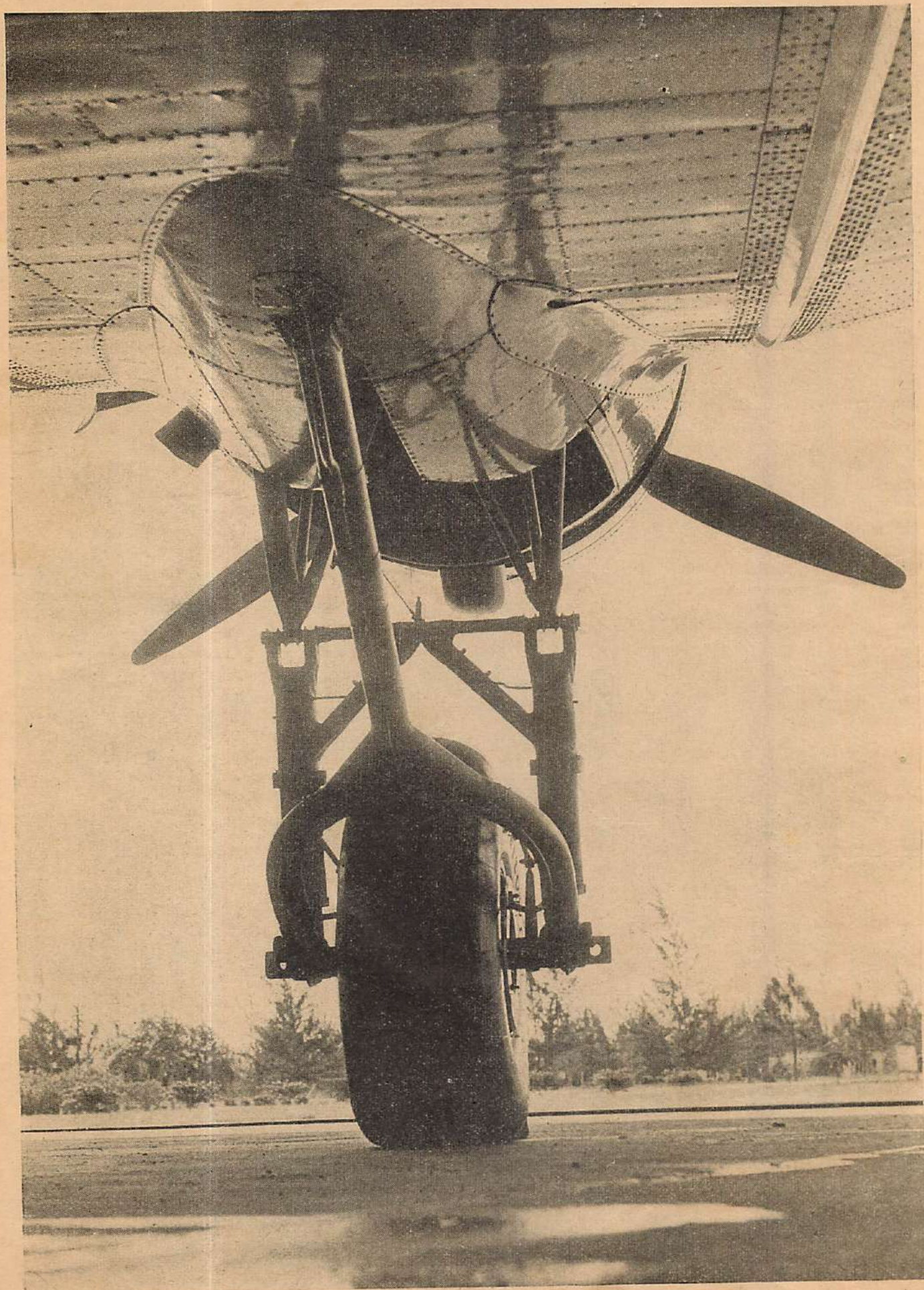
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YOU CAN'T COMPROMISE WITH SAFETY

*An editorial by Jack Knight,
Air Trails Guest Editor*

Today after twenty years of flying I hold the unique position in aviation of being what is in effect a "Doctor of Safety." By education I believe we can overcome any fears a person may have about the safety of flying. I have talked to thousands of air passengers and I know that what fears they have of flying are invariably due to ignorance of the measures that all major air lines take for the protection and comfort of their passengers.

Today flying on any one of the major air lines is far safer than traveling on our highways by automobile, and insurance companies charge approximately the same rates for insuring an air passenger as for a person traveling by train.

There is no business in existence that is subject to more safety regulations and inspections than aviation. From the time the plane is "mocked up" from the blueprints until its tests in wind tunnels, engineers are constantly figuring how to increase the safety factor. Every ounce of material that goes into the construction of an airplane is subjected to the most rigid tests known, and nothing is used unless it passes these tests with a high plus.

Finished planes are subjected to a flying test that far exceeds any possible service condition they may ever be expected to receive. Throughout their service on the air lines they are constantly checked and rechecked, and no plane is allowed to leave the ground with passengers while so much as the fastener of a safety belt is out of order. Mechanically every airliner in service is as perfect a piece of mechanism as it is possible for engineers and mechanics to turn out, from wing tip to tail wheel. Months and even years are spent in testing new ideas before they are incorporated into planes used for the transportation of passengers. Not only do company and factory officials exceed themselves in striving for safety, but government inspectors are constantly on hand to see that no unauthorized materials are used or that unqualified personnel is employed either in the manufacture or maintenance of airplanes.

The mechanics who service the planes at their regular stops have had to prove to the government examining boards that they knew their business and were mentally and morally capable of discharging it.



There is no profession today where the examinations for ability and physical qualifications are so strict as those for pilots. At least every three months every pilot must take mental, physical and ability tests. All for safety of the passengers and the mail.

I think that the ruling that pilots be paid whether they make a flight or not, due to bad weather, was the greatest advance towards safety as far as the personal equation was concerned, that has ever been made in flying. Now the pilot does not have to take unnecessary risks with his life and those of his passengers in order to earn a decent salary.

I shudder even now when I think of some of the crazy flights we made back in the early days when flying the mail in the old Army D.H.4's of wartime fame. How we bucked wind, rain and snow and set our ships down in the most unexpected fields because we felt that, come what might, "the mail must go through." And in those days it was no flying, no pay.

True, we flew alone and it was our own necks we risked, but during those days of wild flying and uncertain weather reports many pilots had time to think out ideas that today are incorporated in all our major air lines to add to the safety and comfort of passengers and pilots.

The human element is something that must always be taken into consideration in every form of transportation, but with the refinement of design, improved aircraft engines, increased power and methods of aiding the pilot to keep constantly in touch with the ground stations and be posted on weather and storm conditions, there is no reason why scheduled air service cannot set up a record that cannot be touched by any other means of transport ever devised.

Judging from the progress I have seen in aviation during the past twenty years, I would not hazard a guess of what airplanes will be twenty years from now. But today you may take it for gospel that the god of aviation is safety, and the man who attempts to compromise safety for the sake of speed or monetary gain is simply fouling his own nest, and this neither the industry, the government nor the air-minded public will permit.

Jack Knight.



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ABOUT JACK KNIGHT

Compiled by Tracy Richardson

With the record of twenty years of flying behind him, Captain Jack Knight recently retired from active air duty. Relinquishing his position as first pilot for United Air Lines, he became that company's Director of Public Education, his job being to keep the public informed of the safety features of aviation. During his twenty years of flying, eighteen of which were spent with the mail and passenger services, he piled up the remarkable record of 2,400,000 miles of flying and 18,000 hours of logged time in the air. To date the world's record for a pilot.

Comparisons are often odious, but this one will give some idea of what 18,000 hours of flying mean. Rene Fonk, France's ace of aces, with seventy-five enemy planes to his credit, had, at the time of the Armistice, slightly more than 400 hours of solo time in the air.

Jack Knight was born in Lincoln, Kansas, March 14th, 1893, but passed most of his childhood days in Michigan, where he graduated from the Buchanan High School and later attended Michigan State College. On completion of his scholastic work he entered the services of Mead-Morrison Engineering Corp. of Chicago, as draftsman, engineer and designer. He left Chicago to go to South Bend, Indiana, as an automotive engineer for Studebaker.

When the United States declared war on Germany in 1917, Knight promptly enlisted in the Army Air Service and was detailed to Ellington Field, Texas, for instruction. He proved to be what flyers call a "natural," and after finishing his advanced training he was kept on at Ellington Field as an instructor in advanced flying and aerobatics.

After the Armistice Knight went back to the engineering profession, making his home in Chicago. Aviation had got in his blood, however, and he soon returned to his new love. He joined the United States Air Mail service in 1919, flying the famous wartime "flaming coffins" between New York and Chicago, and later between Omaha and Cheyenne, known then and now as Air Mail Route No. 1.

Jack Knight was the pilot who saved the fate of the air mail in 1921 when the government was considering discontinuing it because daylight flying did not save enough time to make it worth while. Seven pilots volunteered to fly the mail from coast to coast, daylight and dark, to prove to the powers that be just what they could do. Knight took the night flight from North Platte to Chicago, although after the cross-country test was begun it was supposed to have been canceled because of bad weather. However, farmers along the route were enlisted to light bonfires, and by their aid Jack made it—the first night flight in the history of air mail. This spectacular feat proved a turning point, and Congress voted the money to establish the first lighted airway from coast to coast.

Jack's famous flight was not lacking in uncertainty

and chills, and those bonfires didn't extend along the entire route by any means. Having flown the mail as far as Omaha, he learned that the ship which was scheduled to arrive from Chicago and then take the mail to that city, had been held up by bad weather. They told him the flight was over. So Jack studied the route on a map for an hour, drank some hot coffee and took off for Chicago.

Des Moines, the first stop, was made without great difficulty, in spite of poor visibility and the wrong kind of wind, but after that a snowstorm had something to say about his progress. It caused him to fly low and do some hedge-hopping, and by the time he reached Iowa City his gas tanks were practically empty. But still he was unable to land, for he couldn't locate the airport. The crew there had extinguished the lights and left, taking it for granted that the snowstorm had canceled the flight. Jack kept circling, trying to find a landmark, his fuel dwindling by the second. Then he saw a red flare spring alive in the darkness, about a mile off. It proved to be right on the airport, placed there by a watchman who had heard the sound of the plane.

Jack refueled and set out for Chicago, where another pilot took over the mail and raced it to New York.

When the Boeing company assumed the government air mail contracts, Jack Knight remained with them, and when United Air Lines took over that company and its contracts in 1927, he continued on with them, flying the Chicago-Omaha division and later the Chicago-Denver division. He stayed on this route until his retirement to take up his present duties.

In his eighteen years of carrying the mails Jack Knight has had the opportunity not only to do the actual flying but to watch and study the conditions and improvements that have brought the air mail service up from the old "Jenny" days, when top speed was ninety miles per hour and flying instruments nil, to the modern airliners with their multi-motored efficiency and instruments that keep the pilot informed at all times how every single unit of his transport is functioning, which drive across the continent at speeds up to two hundred miles per hour. From the old days of routes lighted by bonfires he has lived to see the time when he could put the automatic pilot in charge, set its course by a radio beam and figure to the minute when his wheels would touch the concrete runway of an airport lighted by the latest improved fog-piercing lights. Few people indeed have had such an opportunity to keep their finger on the pulse of this giant industry.

With this remarkable record of flying service behind him, Jack Knight was the logical choice of United Air Lines when they decided to appoint an official to contact the public and keep it informed of the advantages and safety of air travel, and of new developments constantly being brought out by aviation engineers.

RIDDLE OF FLYING APTITUDE

Will you make a good pilot? Uncle Sam is willing to hazard \$2,500 to find out.

By LIEUT. W. M. WOOD

Perhaps the most fascinating and tantalizing of all aviation problems is that of flying aptitude. What is it? How can it be measured? Satisfactory answers to these questions would be—or will be—of inestimable value in preventing waste of time, effort, and most important, of life itself in both military and civil aviation. Yet little is heard of a patient group of scientists who have been working long and laboriously, and recently with great promise of success, on this infinitely difficult and complex problem. It is no simple matter to unravel the mysteries of the human soul.

For years there have been recurrent references in the press to the allegedly marvelous ability of military flight surgeons to determine an individual's flying potentialities. Most of these stories probably stemmed originally from a little pamphlet which the Adjutant General's Office had printed in 1928. In 1930 I went to the old Air Corps Primary Flying School at Brooks Field, Texas, with a copy of this pamphlet in my pocket and a large lump of anxiety in the region of my stomach.

I knew that less than half of those who went to the school succeeded in getting through. But worse than that, I thought I might not even get into an airplane. For the pamphlet said that flight surgeons "can analyze any candidate and determine his potential value as a military pilot with only a negligible degree of error." The examination would consist of a reaction time test,

a test on the Ruggles Orientator, "which simulates the evolutions performed in flying," and a personality analysis. "Records show that more than 25 per cent of all candidates fail"—and Uncle Sam would pay for a ticket back home.

With something like the relief felt by witchcraft suspects who have been saved from the confession chamber, the "dodoes" of my class learned that the Orientator was used no more. It had been found that some of the best pilots in the Air Corps couldn't pass a test in it! Moreover, the reaction tests and the personality examination at the school (we had had one such examination already), were for research purposes only. According to the new dogma, it seemed, the only way to find out whether a man could learn to fly was to give him a chance to show what he could do in the air.

Seeing another story not long ago claiming great powers for flight surgeons, and remembering that research has been going forward on the problem, I wondered if it were not really true. So I went to Washington and talked with Lieutenant Colonel M. C. Grow, Chief of the Medical Section of the Air Corps.

Five minutes' talk with Colonel Grow, a most affable and competent-looking gentleman whose appearance of youth contradicts the gray in his brown hair, made it plain that no flight surgeon had been responsible for any story about the flight surgeon's infallibility in spotting a

The School of Aviation Medicine building at Randolph Field, Texas, where Air Corps applicants are examined before entering.

Major E. G. Reinartz conducts a personality test of applicant to determine if he is suited for training for the rigid Air Corps flying.



Official photographs of the U. S. Army Air Corps

potentially expert pilot. Despite the fact that such stories seem to be very complimentary indeed to flight surgeons, the contrary is true, because the possible implication that flight surgeons themselves are making such claims amounts to an aspersion on their integrity as scientists and physicians. A scientist is first of all devoted to the truth, and the truth is that the riddle of a single individual's flying aptitude is so complex and difficult to get at that no man can say that he has solved it, though great progress has been made in the matter of dividing individuals into groups which contain small and large proportions of potentially good pilots.

Colonel Grow agreed that an article clearing up various erroneous ideas on the matter would not be amiss, and I persuaded him to give me the "straight dope," both verbally and in the form of literature, and to agree to check the article for accuracy.

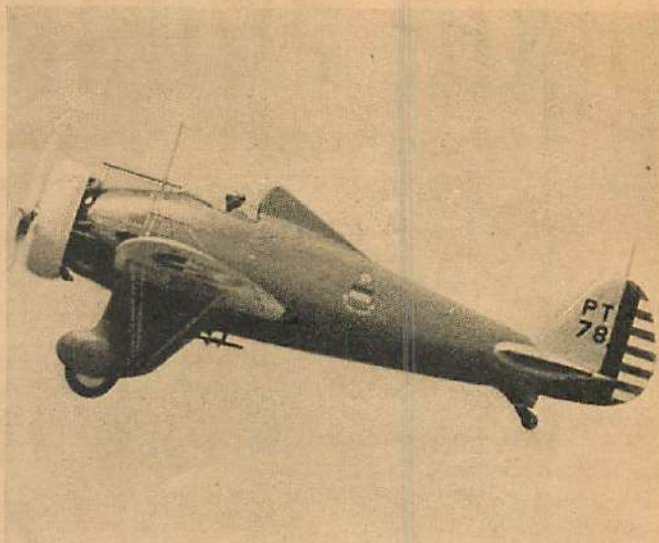
The search for detailed knowledge and a measure of flying aptitude began during the World War. It was soon found that young men with sound bodies and minds could not all learn to fly quickly enough and well enough to meet military requirements. A great many students killed themselves in short order. It was obviously not physical deficiency in the ordinary sense which caused the failures. Neither did tests intended to measure what is loosely called intelligence accurately reveal the degree of a man's flying ability. Baffled, the flight surgeons called it "flying aptitude." That term they defined as the ability to learn to fly well, and then embarked on a long journey into the depths of the human soul in search of a definition of their definition. The search has continued to the present day with most promising experimental results, but practical diagnosis of flying ineptitude, beyond the rejection of the physically and mentally unhealthy, is still left to the flying instructors.

This trial-and-error method of identifying those with insufficient aptitude is an expensive one. The money cost to the government of finding out that a young man can't meet the requirements has been roughly estimated at about \$2,500. The average "washout" is in the school about 60 days and is given about 25 (Turn to page 89)

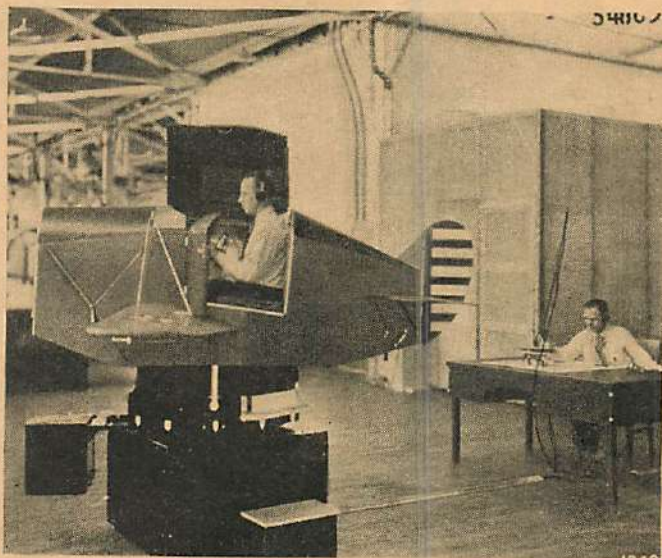
Officer of the Medical Corps conducts the psychomotor tension and peripheral circulation tests on applicant as part of routine.



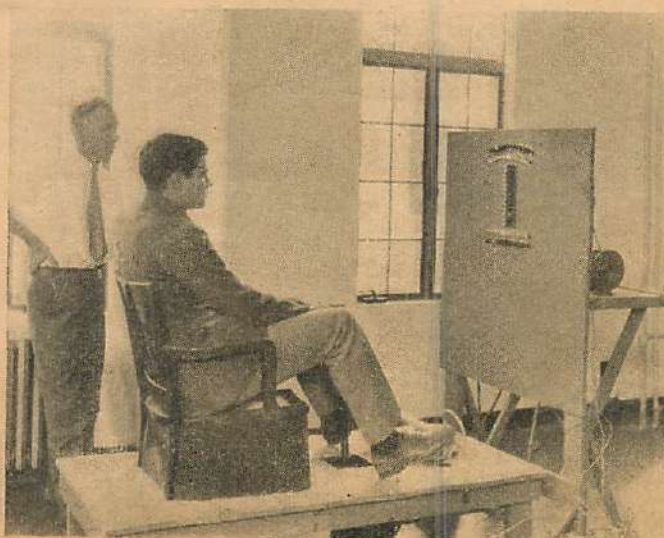
The ultimate reward of the successful men, training in fast single-seater pursuit ships such as this P-26 of the Air Corps pursuit arm.



In the final tests of the applicant the familiar Link Trainer plays an important part in determining rating in instrument flying ability.



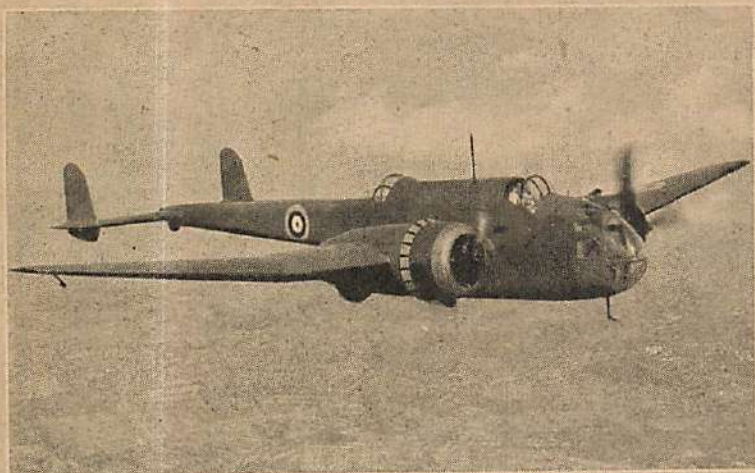
Here we see the recruit being tested for reaction rapidity with the Mashburn Constable Reaction Machine while the examiner watches.



Larg... the severe... A design... of a year... atens...
mail, from... ing planes, o... awarded to the Douglas Aircraft... effort toward the reaching of

AIR PROGRESS

A Summary of Aviation News



Giant bomber for Britain's defense is this latest Handley Page Hampden. The Hampden has flush-riveted stressed-skin covering.

TRANSPORT

The seventeen scheduled air lines operating within the continental United States carried 104,661 passengers and flew 5,621,818 miles, or 44,412,815 passenger miles during the month of April of this year. The same lines carried 497,225 pounds of express and had a seat occupancy percentage of 59.33 compared to 52.8 in April of 1937.

Imperial Airways has been jacking up its schedules so that now a passenger can pay a flying visit to India from London and return again within eight days. A party of sportsmen can fly to Central Africa, take in a two-week hunting expedition and return in just over twenty days. In Australia Brisbane business men may fly to Durban in South Africa in thirteen days. By ordinary means the journey would take about forty days.

The mystery concerning the new Boeing Clippers, the first of which was flown on June 7, is beginning to clear. The company is not backward in admitting that their greatest hopes were not realized, and announces that certain changes will have to be made. One change will be in the rudder position to gain better control in

water maneuvering. Also, twin air rudders will be used instead of the single one originally incorporated. Then the hydro-stabilizers, the sponsons which ride the water during the taxiing movements, will be removed and replaced at a new angle which, it is believed, will give the plane additional lateral stability in water maneuvering. While the first Clipper is undergoing these changes, five others are being constructed.

Edward J. Noble of Connecticut has been named the new chairman of the new Civil Aeronautic Authority, and Clinton M. Hester of Montana the administrator. The other four members who will assist in the taking over of Civil Aviation are Harllee Branch of Georgia, G. Grant Mason of Washington, Robert Hinkley of Utah and Oswald Ryan of Indiana.

It is reported that more than 1,500 military planes will be produced in the United States during the next twelve months. The Army and Navy are scheduled to take 722 and about 800 more will be sent to foreign countries.

The Norwegian government has just concluded a barter agreement

and noise... You... est of... combat... dropped... guiltily... on the... "W"... was j... "Y"... little... ing in... loud?... to the... "Gos"... you wor... you wer... "I kno... here. I... a book... didn't g... to come... reading... house!... some sens... to take th... the Eaglet.

with Italy in which the Caproni company will deliver bombing planes valued at 1,800,000 kroner, for which Norway will pay in shipments of codfish.

Evans K. Smith, a graduate of the Guggenheim School of Aeronautics, who has been associated with several air transport companies, will open an air traffic school at 41 East 47th Street in New York City. The course, which will require about eight weeks, will be held in the evenings and will cover all phases of air traffic.

The Junkers company of Germany is rushing to completion a new 2,000 h.p. Diesel engine which will be ready for tests soon. It will be a twenty-four-cylinder four-crank design motor in which 144,000 power impulses a minute will be turned out. It will have a frontal area of $8\frac{1}{4}$ square feet, be 39 inches in diameter and weigh about 1 pound per h.p.

Colonel J. Monroe Johnson of the Department of Commerce declared recently that more than 40,000,000 will be using the scheduled air lines once-ocean air travel opens up with proposed plans.

Sir John Reith, a six-foot-six-inch Scot who for eleven years has been the ruler of the British Broadcasting Company, has been appointed to the full-time chairmanship of the Imperial Airways at a salary of \$50,000 a year. He is 49 years of age and absolutely impervious to any form of newspaper criticism.

Plans are being completed for a new marine air base at Vancouver, B. C.

The total mileage of the world's air routes now exceeds 300,000 miles.

Five major air lines, Pan-American, Eastern, United, American and TWA, intend to cooperate in the erection of an air terminal near the center of New York City at a cost of \$2,000,000.

(Turn to page 90)

The B-18 A bomber is a two-engine plane, somewhat "lar

DECEASED BROKEN

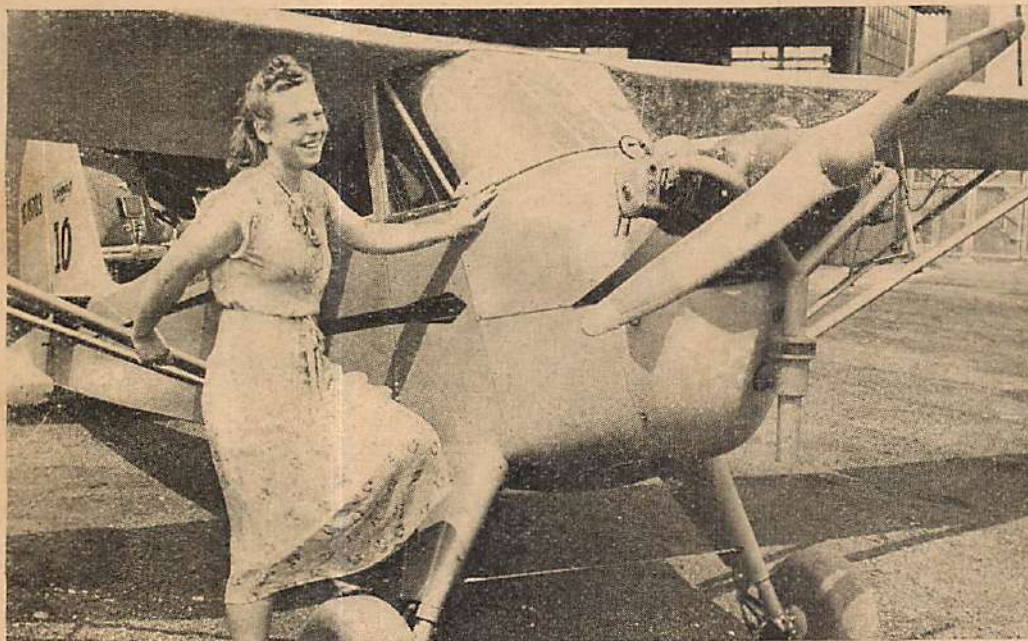


THIS WINGED WORLD



Wide World

Left—Gay young blades! A mechanic of TWA's maintenance base checks over part of what is said to be the largest shipment of propeller blades to a commercial airline. These blades are for assembly into the hydromatic type of (Hamilton) three-bladed propeller unit used on the modern sky transports.



International

Left—A miss is as good as a mile and also a smile, as demonstrated by Dorothy Fulton of Teaneck, N. J., who lost her propeller in midair. Undaunted, Miss Fulton calmly cut the motor, and spiraled down for a safe landing at Bendix Field. Her only comment was: "It was nothing to get excited about."

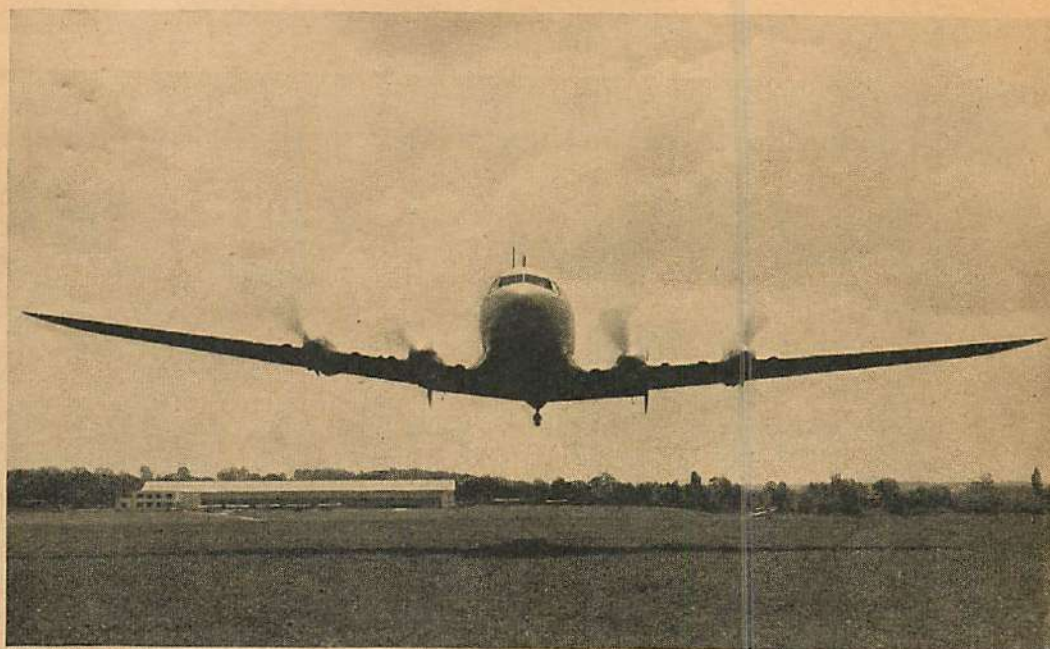
Below—The Marine Corps pays a call at Miami. Enroute to their base at Quantico, Va., fifty-four Marine planes with fifty-six officers and sixty-three enlisted men stop over for a short rest and check on way back from training maneuvers over the Caribbean. The ships are Great Lakes Dive-Bombers.

the news



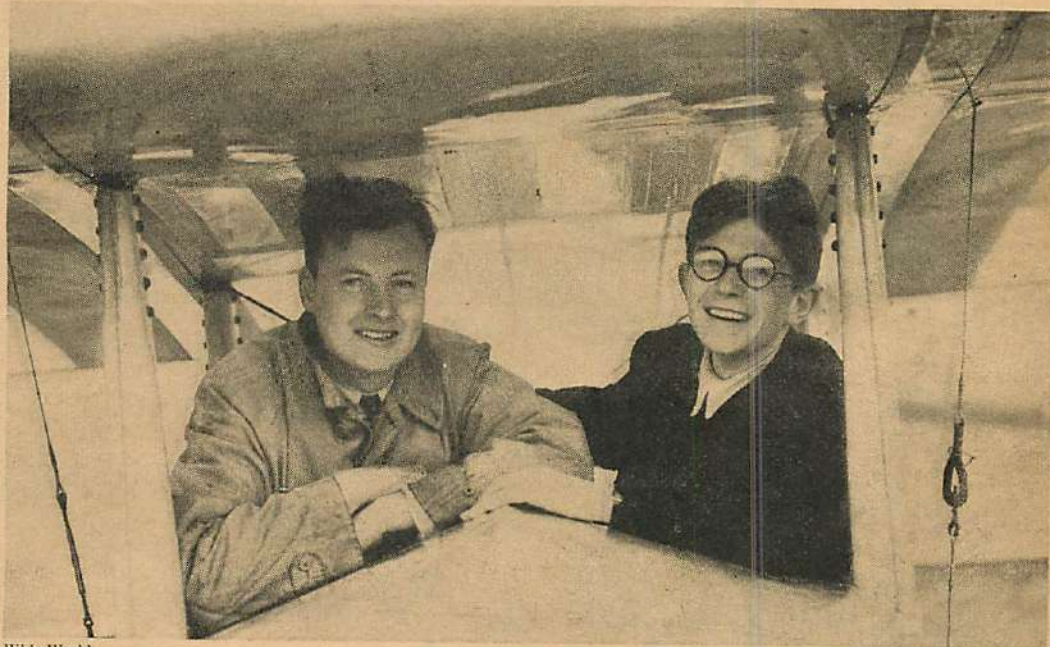
International

Right—Coming at you! An unusual head-on shot of the giant 4,000 mile "Albatross" trans-oceanic airliner. This De Havilland of exceptionally clean design is capable of 210 miles an hour as powered with four Gipsy Twelve 505/525 h.p. supercharged engines. Note cooling airducts along leading edge.



Authenticated News

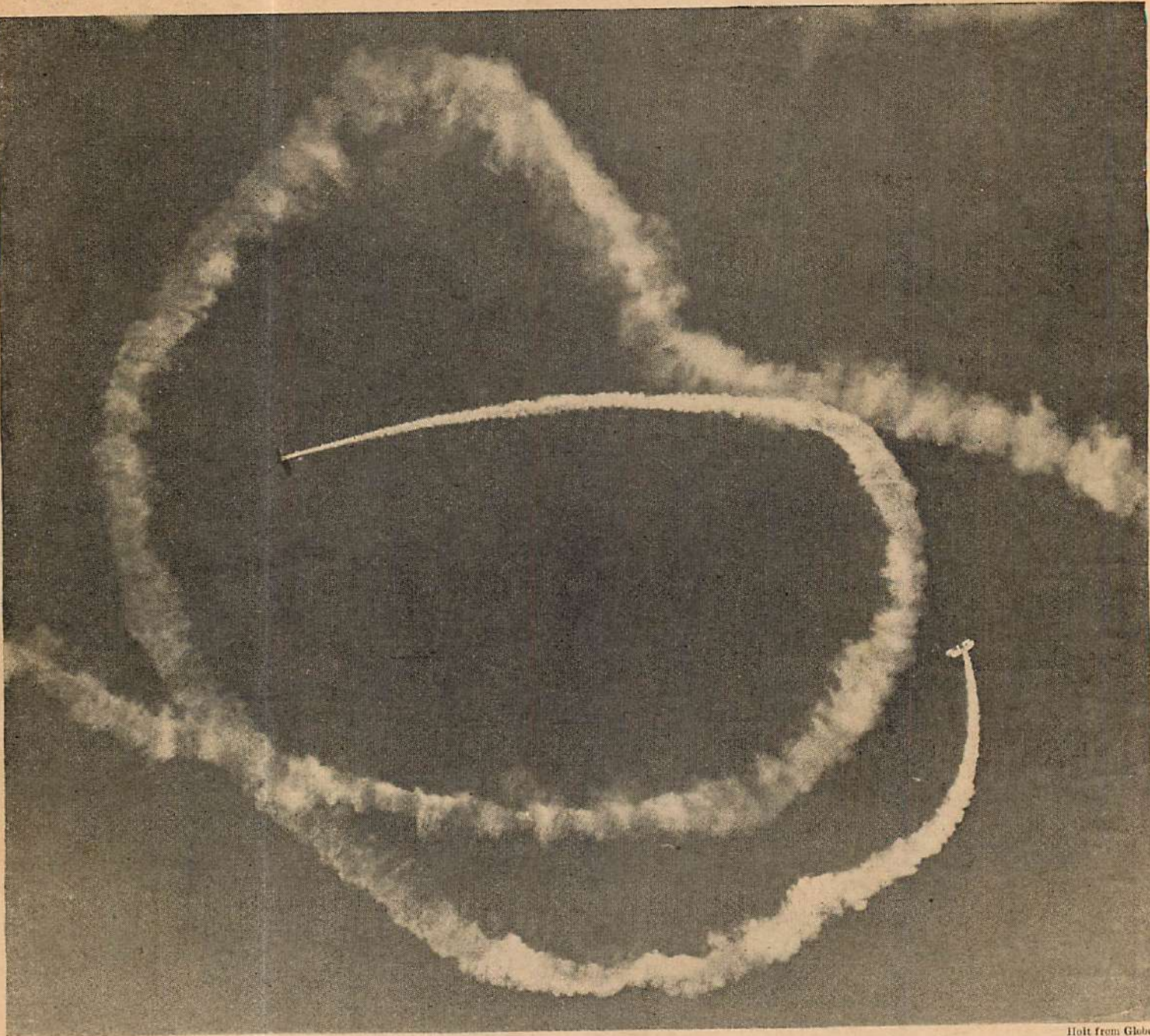
Right—Breaks record for going nowhere on nothing for twenty-two hours. The world's record goes to the two glider pilots right, Flight Lieut. W. B. Murray and Mr. S. Sproule, for remaining aloft over 22 hours at Dunstable Downs, Bedfordshire, England, in their two-place glider Falcon III, on July 7th, 1938.



Wide World

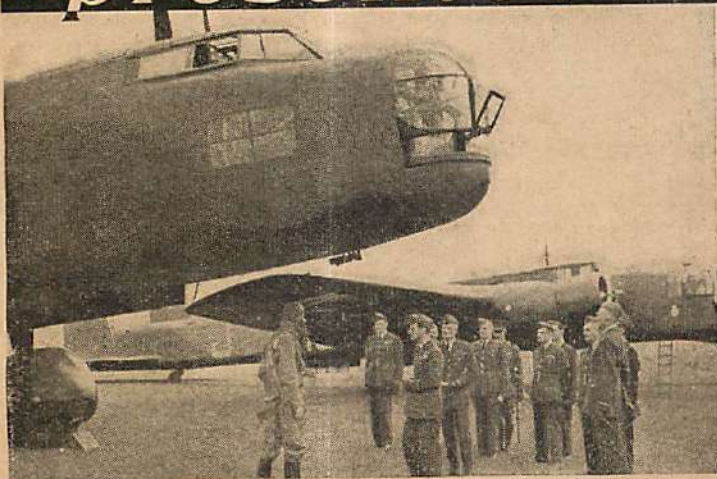
Below—Man carrying scale model! Test flights of this one-third scale size model of the Nord Potez 161 tell the engineers what to expect of the real transoceanic seaplane when completed. The engines of the model are of 40 h.p. as compared with the 930 h.p. engines to be used on the finished ship.





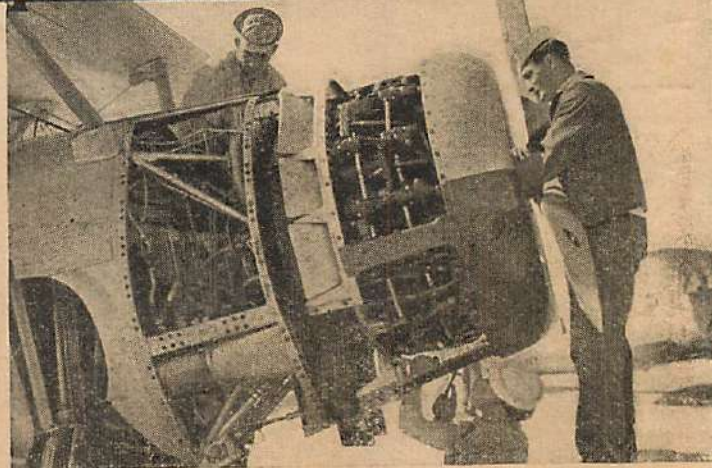
Holt from Glob

presented in pictures



Wide World

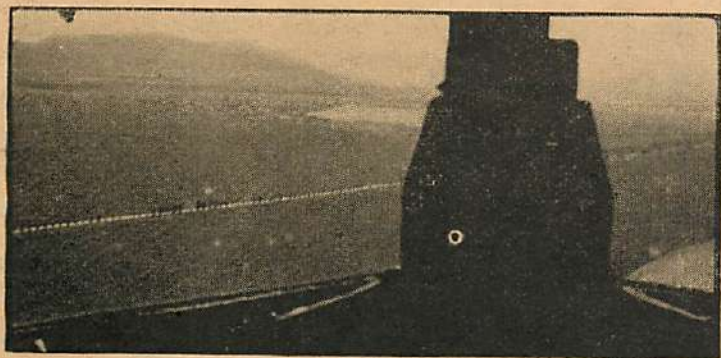
Kingly interest. His Majesty King George inspects bombing squadron stationed at the new aerodrome at Harwell, in Berkshire, England.



International

A Curtiss SBC-3 gets the works. Personnel at the Naval Air Station, North Island, California, check over the 1000 h.p. Twin Wasp engine.

FROM THE FRONT OFFICE



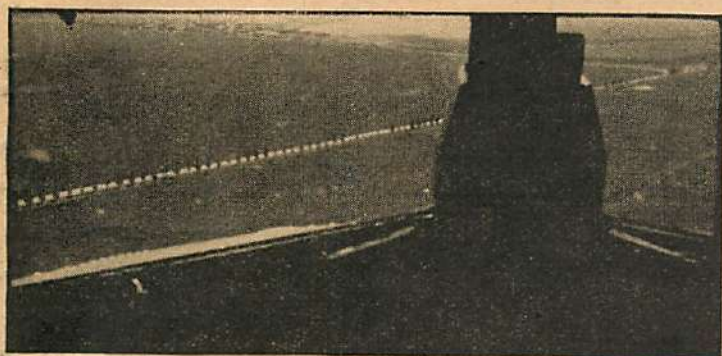
1

How a landing in a DC-3 looks to the pilot. The Editor takes a series of photos coming in for a landing at March Field, California.



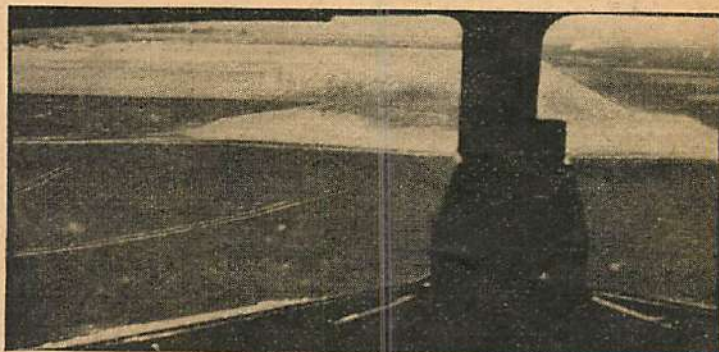
5

The transport passes over road along edge of field and the runway looms up dead ahead, as the huge ship glides in with flaps down.



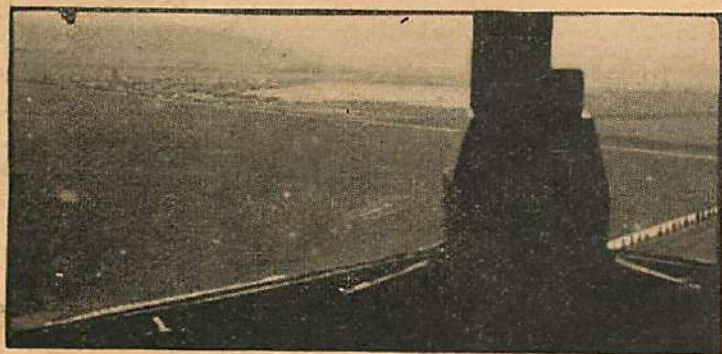
2

The giant TWA luxury airliner lines up the runway for a landing. Note the roadway below now about to pass beneath the plane's nose.



6

About to land, the ship passes over the end of the runway as the nose slowly rises into the landing position, with both engines throttled.



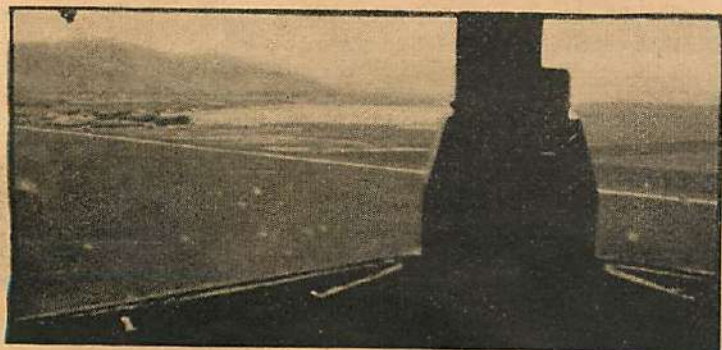
3

The engines are throttled to reduce forward speed and copilot prepares to lower flaps. Road almost out of sight under transport's nose.



7

The wheels touch and we are down! Note the position of nose in relation to the horizon as compared to that in the preceding photos.



4

Copilot gives Captain Rice "full flaps" and transport sinks lower, while the wheels have already been lowered and locked in position.



8

Now we're taxiing up to the Army hangers seen to left of runway in the preceding pictures. Thanks for a perfect landing, Captain Rice!

EX - MECHANIC

BY WILLIAM W. EHMER

"Co-pilot Beale is waiting outside," announced the secretary.

"Okay, send him in," replied Chief Pilot Swanson of International Air Lines.

A few seconds later Eddie Beale entered the office and smiled a greeting toward his chief. Conversation was temporarily impossible due to the roaring motors of the morning ship to Havana commencing its take-off on Biscayne Bay in front of the building. Swanson thoughtfully watched the transport leave the water, it being reduced to a mere speck climbing skyward before he swung around in his chair and said:

"Eddie, I sent for you to report some bad news. Thinking the matter over, I decided it wouldn't be fair to keep you in ignorance of a new company policy. The fact is that new regulations will not permit me to check you out as a captain. You realize, of course, that I have been building you up to it for the past year and believed it could be put over. Now, someone has sold the big boss on a high-hat idea that every man checked out should be a college graduate. From now on every new co-pilot hired must meet that qualification, and although this ruling will not cause any of our present co-pilots to be fired, they will never be promoted.

"Eddie," Swanson continued with a gesture, "I argued my head off but the Old Man wouldn't budge an inch. He claims International is swamped with applications from men who can meet all requirements and there is no necessity of stretching a point to accommodate a man who can't. I think it's raw but this is simply one of the things that can happen when there are more pilots on the market than jobs to be filled. Now, if you can line up something with another air line, or any place else where you can get a fair break, I'll recommend you as tops, but as for International—well, this rule just ties my hands."

This concluded the interview, and Eddie was in a daze as he walked to his car. His eight years with the company passed before him as through a kaleidoscope. International had been a small air line when he started to work as a mechanic in the shops. This was fol-

lowed by promotion to flight mechanic aboard the trail-blazing amphibians of the line. When the ships were equipped with radio telegraph, he had gone to school at night and on his days off to qualify for a license. When the Department of Commerce issued additional regulations, requiring the second man in the cockpit be licensed as a pilot, Eddie spent his savings for the use of a ship, built up his solo time, and passed his Transport.

This was followed by a series of spare-time technical courses sponsored by the company, then promotion from flight mechanic to regular co-pilot. Now, when ready to cash in on his efforts, he found the door closed to him. A permanent job at two twenty-five when he should be stepping into one paying six hundred. Last but not least, he was heartily tired of flying as co-pilot. No! Definitely no! He was not going to sit there as co-pilot all his life.

But what else could he do? The majority of domestic air lines was not employing co-pilots over the age of twenty-eight, and Eddie had just turned thirty-one. Another thing, most of his experience was on flying boats, and that would help him but little in seeking a job with an air line using land planes. One thing certain, he was not going back in the hangar as a mechanic. That was out. Nor would he take a job as flight engineer of the new four-engined ships. If he was going to fly, he would fly as a pilot. Oh, hell! He might do anything if he got hard up enough. Well, right now he would stick to what he had, meanwhile looking around for something better. And with that conclusion he disgustedly stepped on the starter of his car and drove home.

The following morning Eddie left on a trip to Rio with Al Parsons in an S-43. Parsons was one of the veteran pilots on the line, and had helped Eddie considerably in his progress from the hangar floor to the cockpit. Recommendations to company officials at the proper time, plus plenty of landings, take-offs, and instrument practice while on long trips, proved invaluable. Eddie felt that if he had to fly as co-pilot all the time, it would be far more pleasant to do so with

Parsons than with anyone else he could think of.

The flight to Rio was uneventful; first night San Juan, second Port of Spain, third Para, fourth Recife, and then Rio for a two-day layover.

Completely rested up after their two days at Rio, Parsons and Eddie departed on the return flight to Miami. Several of the scheduled stops had been made and the northbound trip gave promise of being as trouble-free as the one south had been. However, the airliner had just risen from the water at Ilheus, Brazil, when trouble overtook them. The left engine sputtered a second and then quit—cold. At the first sputter Eddie's eyes swept the instrument board, noting immediately that the engine had lost fuel pressure.

It was a predicament where a few seconds' hesitation could mean a serious accident, as the ship, while able to maintain flight with only one engine, required both to accelerate from a take-off to a climbing speed, in order to clear harbor obstructions. Insufficient space remained ahead to land the ship without crashing it into the docks before coming to a stop, as flying boats do not have the benefit of brakes. Nor did the ship have sufficient altitude to safely negotiate a turn. For a split second the aircraft faltered like a bird wounded in flight, then the left engine returned to life, and the liner gracefully swept over the obstacles in its path.

In the cockpit of the ship it was not quite as effortless as it appeared to the stevedores working on the docks. Eddie was energetically pumping gasoline to the left engine with a hand wobble pump installed on the bulkhead above his seat for such emergencies. Captain Parsons gained a little more altitude, then started a gentle turn, circled back, and landed where he had previously taken off. While taxiing on the water toward the barge, all combinations of tanks were tested, but the left engine would run only when man-power was applied to the wobble pump. Thus the pilots eliminated the possibility of an air lock or a clogged fuel line.

"Probably the fuel pump," said Eddie. "Well, we have a spare."

"How long will it take to change it?" asked Parsons.

"About two hours."

As Ilheos was only a small refueling stop, International merely retained a small crew of laborers to maintain the barge anchored in the harbor, and to assist in the refueling of planes. The company's policy was to station mechanics only at the overnight stops, with the procedure of sending out a relief plane in case of mechanical difficulties.

Captain Parsons taxied the ship up to the barge, where it was made secure. Eddie commenced unpacking the emergency tool kit, and the spare parts box carried aboard all ships of the line. Next he disconnected one of the two storage batteries connected in parallel for the ship's radio, engine starters, flap motor, and lights. Then he rolled up his sleeves, climbed up to the engine, and went to work. First the streamlined cowling around the engine was removed, and passed down to the barge crew standing by on the ship's nose. Following this,

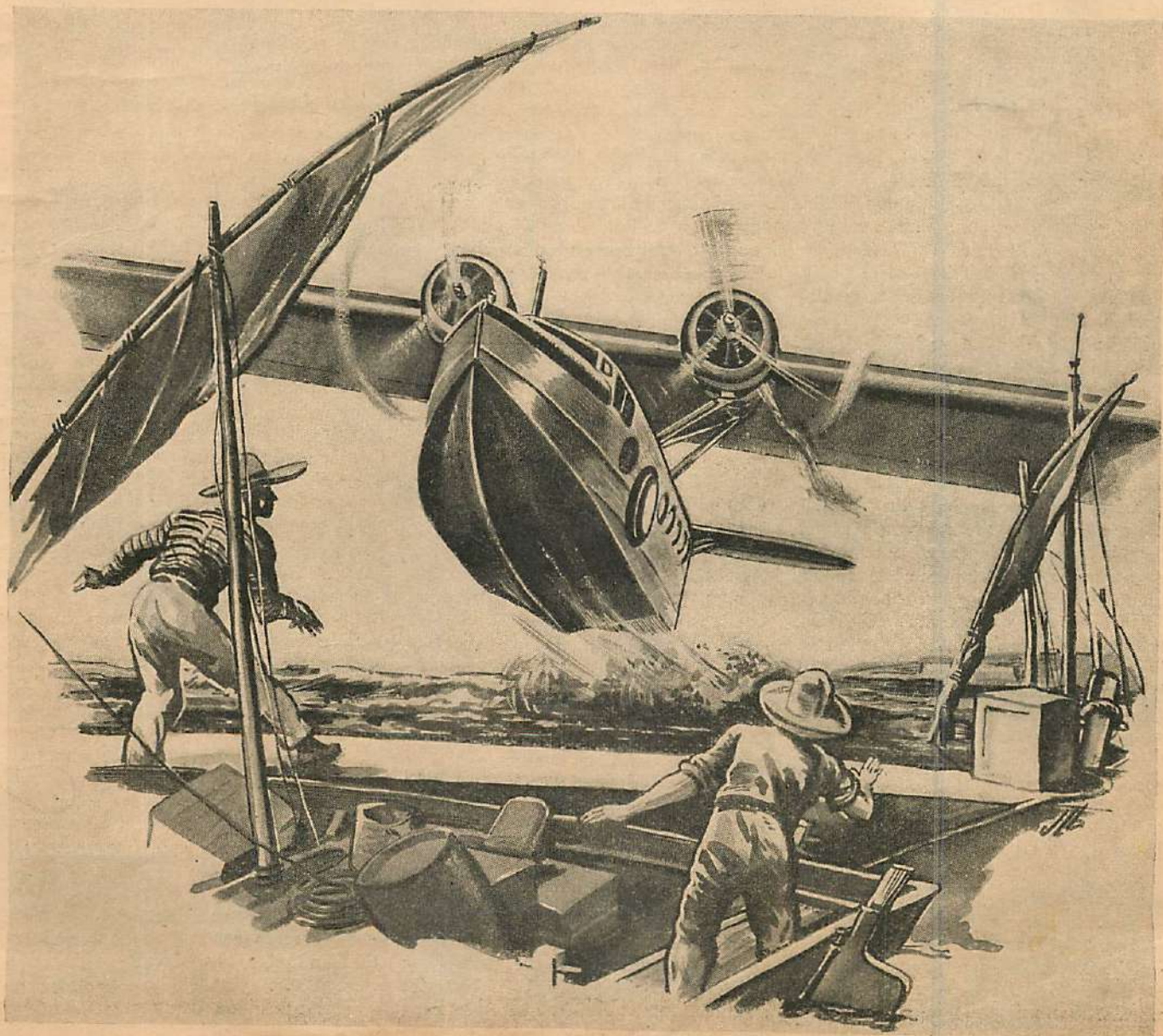
the flow of gasoline from tanks through to the engine-driven fuel pump was checked okay, and Eddie definitely decided the trouble must be pump failure.

To change a fuel pump in a well-equipped hangar with motor stands to work from, with all the required tools handily available, is one thing, but to do the same job while the ship is on the water is quite another. Experience had taught Eddie the risk of dropping some indispensable part in the water, and he stationed a member of the barge crew in a rowboat tied up directly under the motor. Eddie, working with both hands from a precarious footing, was in constant danger of slipping and might any moment be compelled to save himself from falling at the expense of whatever he held in his hands. A major time-consuming portion of the task was moving other units of the accessory section, in the rear of the motor, in order to have sufficient room for the disconnecting of the fuel pump. All units on the engine were wrench-tightened, then

locked with safety wire. This was no two-minute job.

Meanwhile, there was other activity connected with the ship. The radio operator was busy handling messages between Captain Parsons and Operations Headquarters pertaining to details of the delay, probable departure time and the like. The purser had taken the passengers ashore for luncheon, to get them away from the hot sun beating down upon the barge. One of the passengers, a business-type-looking American, had elected to remain, and seemed somewhat interested in the repair work in progress.

At the end of two hours the installation of the new fuel pump was completed, and all units connected. The purser and passengers were climbing aboard the barge as the two pilots were starting the left engine for a fuel pressure check. The motor started easily, ran a few seconds, and started to miss. Eddie manned the wobble pump to keep the motor running as Parsons increased the r.p.m. as much as he dared with the



ship tied up to the barge. The fuel pressure gauge indicated only what pressure was built up from the strokes of the wobble pump. Should Eddie slow up on the pump, the indicator would commence falling back to "zero" and the motor to sputter.

"Well, I'll be damned!" said Parsons. "What do you make of it, Eddie?" he asked as he cut the master switch.

"I don't know what else it could be except the pump, yet I just put in a new pump," answered Eddie thoughtfully. "We're getting gas to the pump, and the line beyond the pump is okay. It can't be carburetion trouble, otherwise she would not run even using the wobble pump."

"It sure as the devil is something," growled Parsons. "You sure that new pump was all right?"

"It was tagged O. K. The Inspection Department is awfully particular about spare parts. They check them every trip."

"How about the automatic mixture control?" queried Parsons. "You know they've given quite a bit of screwy trouble."

"No, Al, the automatic mixture control works okay in all three positions as long as I pump the gas. Absolutely, the only symptom seems to be that we just can't get fuel pressure, even with a brand-new fuel pump." There was exasperation in Eddie's voice.

"I can't think of anything else either. We've done all we can. Guess we had better radio for a relief ship before we lose any more time, and let them worry about it." Parsons reached for the radiogram blanks.

Eddie was disgusted with himself because he had encountered a motor trouble he could not solve. When he had worked as a mechanic his reputation as an expert trouble-shooter had given him a measure of personal pride, and here he was stumped on a simple problem. It might just be his luck that one of the mechanics on the relief ship would lay his hands on the trouble five minutes after he looked inside the motor, thus making Eddie appear ridiculous.

He climbed from the cockpit to the baggage compartment, and noticing the inspection tag torn from the fuel pump lying on the floor, absentmindedly picked it up. It was a factory tag indicating that the pump was a new one, as had it been one of the periodically overhauled pumps an International overhaul shop tag would have been attached. Eddie put the tag in his pocket to keep for reference in the routine investigation that he knew would follow his arrival in Miami.

Captain Parsons finished writing the radiogram, having gone to some length in describing the symptoms, and the steps that had been taken thus far toward correcting the trouble. This in-

formation would give the chief mechanic some idea as to what spare parts might be required to load aboard the relief plane. He passed the message to Eddie for confirmation in case the co-pilot had anything to add to it, and then to the radio operator for transmission.

Eddie continued pondering the situation, and for some indiscernible reason the notion of that factory inspection tag's having something to do with the trouble kept passing through his mind.

Then, while looking for his bag to change his grease-stained shirt, the answer dawned upon him like a flash. The identically same type of fuel pump was supplied for both Cyclone and Hornet engines. However, the rotation of the accessory drive on a Cyclone was in reverse to that of a Hornet; hence, should one attempt to use a pump assembled for a Cyclone in a Hornet, no fuel pressure would be obtained. Eddie knew it was merely a ten-minute job, once he removed the pump from the engine, to disassemble it and reverse the drive gear. This would not change the exterior appearance of the pump, and it seemed plausible that a shipping clerk at the factory could make a mistake in filling an order. As fuel pump failures were quite rare, Eddie figured it more than likely that he might be the first one to discover such an error, especially if that particular shipment had been used to stock the emergency spare parts boxes carried aboard all the planes.

Elatedly he hunted up Captain Parsons and found him on the barge in conversation with the passenger who had not gone ashore.

"I believe I've diagnosed our trouble!" Eddie exclaimed, hurriedly explaining his theory and displaying the factory tag, which merely stated the pump was tested by a certain inspector.

"How long will it take?" asked Parsons.

"About an hour to get the pump off, ten minutes to change the rotation, and an hour to reinstall it."

"Okay, hop to it, and if I can be of any help—yell." Then as an afterthought the captain added, "We'll let that radio to Rio stand—just in case. If we get away all right, we can radio them then and turn the relief ship around."

At that moment the radio operator emerged from the ship and reported: "Captain, the batteries are too low to deliver enough power for the transmitter. I have been unable to raise the Rio station."

Parsons, surprised, looked at Eddie, who explained:

"Al, I've disconnected one battery and have been saving it for the starters."

Somewhat vexed, Parsons asked, "Well, can't we crank the motors by hand if the radio runs both batteries down?"

"Not with these direct-drive starters. It's practically impossible—especially when they're cold. I've tried it in Miami, with plenty of help, and we didn't even begin to start it."

"Well, what the hell are we carrying two big emergency hand crank handles around in the ship for? Ballast?" exploded the captain.

"I don't know what they're good for with this type of starter," said Eddie with some emphasis. "None of the Big Shots in Miami would believe me when I told them you couldn't use these starters with hand cranks. Al, if I ever get caught with a dead storage battery and these damn starters, it will not be my fault."

"Okay, Eddie, we're not going to get caught. I believe you, and when we get back to Miami some of those 'experts' are going to have to prove to me with a crank handle that you're wrong before I believe them. Hop on that motor and let's start getting out of this dump."

Then Parsons turned around and called: "Purser! Take this message ashore to the cable office and mark it urgent. Better add to it that we expect to get away in about two hours. We'll radio them when we do, and they can turn the relief ship around."

Eddie worked feverishly, and was testing the motor again in less than two hours. As he expected, this time the fuel pressure was registering satisfactorily. Passengers were loaded immediately, and the ship taxied around the harbor for the "warm-up." A flat calm existing on the surface of the water, Captain Parsons turned the nose of his ship seaward when the oil temperature gauges showed forty degrees Centigrade. International's operations regulations required a double check of the normal procedure immediately prior to each take-off, which to the uninitiated might seem a waste of valuable time.

"Gas on?" asked the captain.

"Gas on," answered Eddie, visually checking the gasoline gauges and the tank selector valves.

"Hatches closed?"

"Hatches closed," replied Eddie, who had received a signal from the purser to that effect.

"Standard carburetor?"

"Standard carburetor."

"Heat off?"

"Heat off," after a check of the carburetor heat controls.

"2250 r.p.m.?"

"2250 r.p.m.," repeated Eddie, checking the settings of the constant speed propellers.

"Fifteen degrees of flap?"

"Fifteen degrees of flap," answered Eddie a few seconds later as he stopped the flap motor when the wing flap gauge read fifteen.

This concluded the (Turn to page 98)



You can obtain air travel insurance at surface rates. Here's how and why.

By TRACY RICHARDSON

There has been a lot of dreaming connected with the aviation industry. It took a war and all kinds of men to bring these dreams to reality. It is such a recent industry that all of us know something about its growing pains. But it has exchanged its three-cornered wrappers for "longies" and stepped out. Aviation is now in the big-time class. Considered thus, it must pass certain important tests, and the chief of these in the public mind revolves around the question: Is it safe?

During the World War the morning rain beating down on the corrugated iron roof of the flyers' quarters would bring out lusty choruses of "Send her down, Job, send her down!" A day of rain meant a day of rest, another

The Douglas DC-3, standard equipment on major domestic air lines and on such foreign lines as the K.L.M.

day to live. There was such a small amount of night flying that it really did not count.

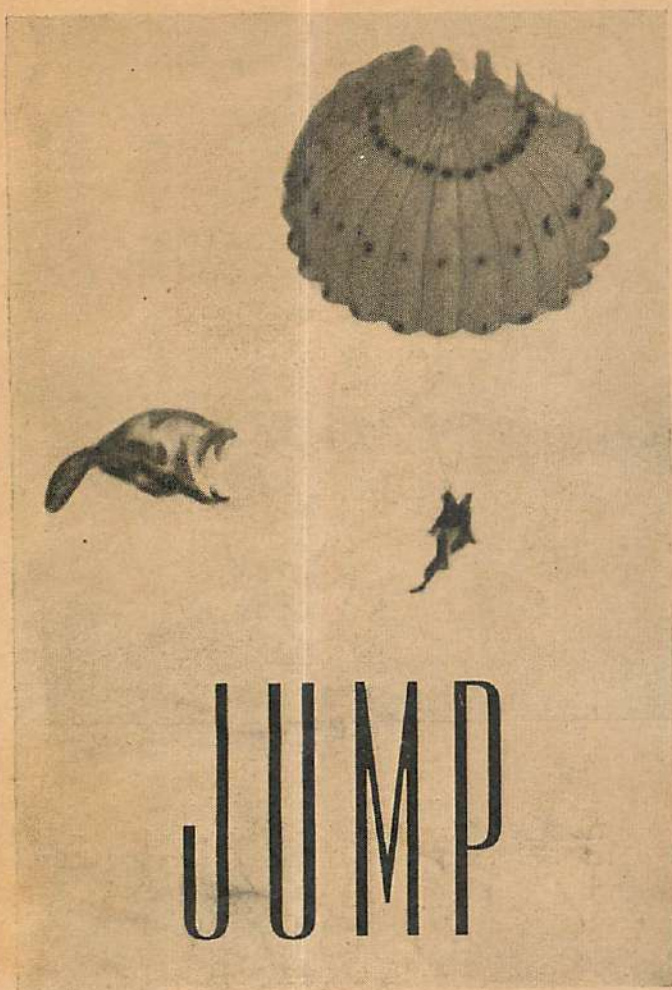
Today there are few weather conditions that would stop the activities of the air service of a first-class power engaged in war. They can even make photographs through fog and the darkness of night. It is claimed that they are able to chart a course to a given objective a thousand miles away, fly there blind, using instruments alone, dump their cargo of death-dealing high explosives, and return to the home base without ever having seen their target or the country over which they flew.

War flying is one thing. Flying passengers over a scheduled route is something else again. In war the objective is to get there and get there first, then smash, smash, smash. If the plane, pilot and crew do not return it is just another casualty of war, (Turn to page 96)

Engines undergo complete overhaul by master mechanics every 400 hours—top overhaul or general inspection after every trip.

Thirty technicians with American Airlines check every instrument. Checked replacements permit continual operation of planes.





A professional jumper recounts the many thrills and experiences of his years as a "silk sailor."

By GEORGE DE GRANGE

Air Trails has asked me to try and set down on paper the entire story of parachutes as gathered from my diaries and experiences as a professional jumper during the past several years, and to me that's a steep order because of space limitations. But here goes.

I began jumping with the Army Air Corps way back in 1930 and liked the experience so well I stuck with it and am still a professional jumper and rigger. From the day I stepped out of the little green door of the Ford tri-motor at Chanute Field as a member of the graduating class of parachute riggers, I have been thoroughly sold on parachutes both as life-savers and as a means of providing thrills for the morbid-minded. (I am still convinced that those who gather to watch an exhibition jump are prompted largely in the hopes of "seeing something.")

My own experiences with "silk sailing" have been varied and thorough and have included several barnstorming tours, National Air Race participations, county fair and air show exhibitions, and in fact any type of

thrill that I felt might warrant a try in an honest endeavor to bring in a few more bucks.

My decision to become a professional daredevil was not made on the spur of the moment, however. Far from being a daredevil in the natural sense of the word, I began an exhaustive and intensive investigation of the risks and safety factors involved before trusting my precious neck to any uncertain piece of silk. The Army training I had undergone was sufficient to prove the ultimate safety of the proper equipment properly used, and it was only a short step from the military to the civilian after I had received and approved the outfit I had ordered and with which I planned to eke out a living on the "outside."

For benefit of the layman I will advance the information that a parachute consists merely of a large silken umbrella, generally at least twenty-four feet in diameter, carefully folded accordionlike and placed in a suitable pack. The necessary shroud lines or silken cords which join the user to the umbrella are carefully tucked back and forth in suitable pockets in this pack to prevent their fouling. These lines, of course, play out in proper sequence immediately the large canopy leaves the pack and starts filling with air.

The entire apparatus is, naturally, actuated by the well-known rip cord and opening elastics which insure the proper release and projection, respectively, into the air flow. This air flow, incidentally, will range anywhere from 80 to 120 miles per hour, depending on your own particular falling body's inertia, which is governed by the length of delay you care to make before pulling the rip cord and the speed of the airplane you have left.

It was only natural that my primary lesson in the Air Corps was how to leave a disabled airplane in the manner prescribed by Hoyle. In a spin, leaving on the outside of the spin so that you are thrown rather than held to the ship, was good dope. Knowing that to delay opening the 'chute after leaving a fast-diving airplane so as to decrease speed and allow for deceleration, thus avoiding the possibility of blowing the 'chute into rib-

Left to right—Quickly attachable chest or emergency pack; seat-pack parachute; the back-pack type, a reliable favorite.



bons, was likewise good dope. Professional jumping, on the other hand, has taught me things I did not learn in the Air Corps, things that are of inestimable value in an aerial emergency. I remember one case most vividly.

It was, I believe, one of my first night jumps, and the fact that the night was exceedingly cold, windy and anything but favorable did not help matters. I had contracted to make a night Santa Claus leap for the benefit of a Washington, D. C., Milk Fund over nearby College Park Airport. From the beginning I was wary of the bothersome Santa suit which I naturally had to wear.

High over the airport my troubles began when I started climbing out on the wing in preparation for the drop over the side. The first difficulty came in the form of the false whiskers blowing all over my face and in my eyes. (During subsequent jumps I learned to put these on after the 'chute was open and I was riding down.) Next came the deception in estimating of altitude which night invariably brings on. The natural impression is that you are not nearly as high as is actually the case.

Having gauged the appreciable amount of drift known to exist, I leaned forward to drop from the trailing edge of the wing, but was brought up short by the projection which serves as a step on the Stearman I was trying to leave. Abruptly the difficulty was apparent. The said step had caught between my back and the parachute harness and held me squirming frantically in an endeavor to get off before the ship carried me too far beyond the point where I knew it necessary to get off. The mistake I made was in hugging the fuselage too close, and it was an easy matter for the step to snare me as I brushed by. Eventually, at 70 m.p.h., I succeeded in wriggling off—and missed the field by a wide margin.

Such an incident might prove serious in an actual emergency where altitude and time are important factors, or if the 'chute is accidentally blown open. In the latter event the jumper would be literally pulled apart if the retaining projection, whatever it might be, did not give way.

A startling self-photograph made by the author during a descent with three parachutes, a trick especially done for Air Trails.

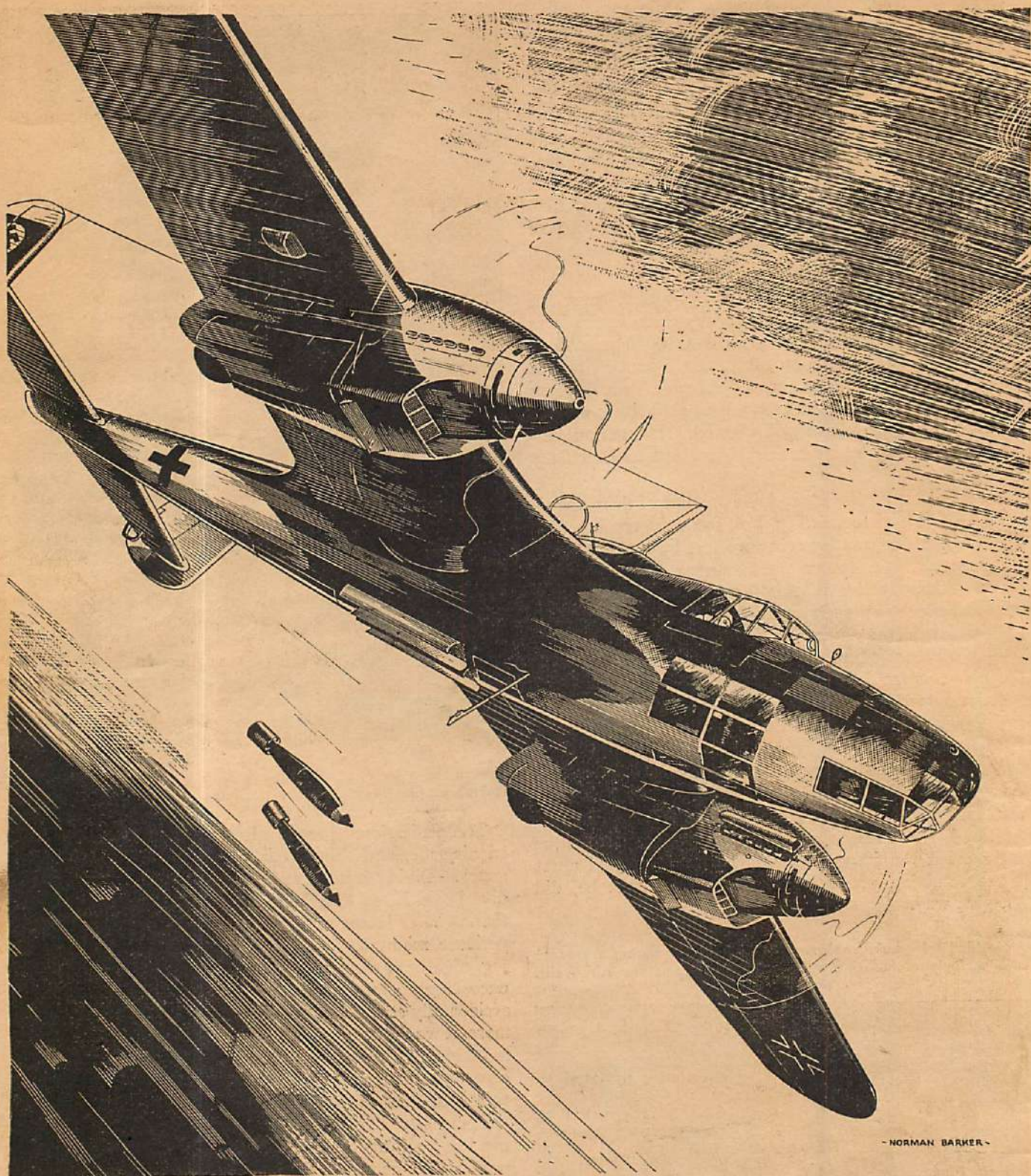


The author after one of his jumps from a Waco F. Small and fast ships like these are not particularly adapted to jumping.

The professional jumper also learns just how to leave an airplane, and this too is of value in time of emergency. Diving head first into space in a graceful swan dive is O. K. as dramatized in stories and movies, but the beginner learns early through theory (an actual experience might be fatal) that the space from the trailing edge of a wing to the horizontal stabilizer is often exceedingly short, and should any part of his anatomy accidentally strike that stabilizer going sixty miles per or more, it would be much better for that part of his anatomy to be his feet instead of his head. A slight blow on such occasions has resulted in unconsciousness, and an unconscious man can't pull a rip cord.

Personally, like most other jumpers, I prefer to take my leave sitting down facing backward, and when the proper time comes to duck my tender head and somersault off. Not so spectacular but infinitely safer; and who the heck can see how one leaves from two thousand feet below?

Freak jumps, such as cut-aways, releasing two or more 'chutes on the way down, delays and pull-offs furnish pointers and diversion for the professional, but do little more to fill his coffers. In order to secure some pictures to accompany this article I made a jump with the intention of opening three 'chutes on the descent. Heretofore my greatest feat along this line had been to release two 'chutes successfully, and the thought of three called for a little consideration. In addition to this I plan to take a small box camera along and (Turn to pag



ships in black and white

Most formidable of bombing planes on the Continent is the dread Dornier DO-17, powered by two 950 h.p. Daimler-Benz engines. Aptly dubbed the "Flying Pencil," the DO-17 presents a remarkably small frontal area as it bores along at 267 m.p.h. maximum speed. The DO-17 is not an experimental ship; many have been delivered to the German government. Replete in

camouflage, the squadrons of Dorniers serve as an example of the deadly efficiency which European air forces must possess. The structure of this ship is metal throughout. Needless to say, the high speed is attained by the use of all modern improvements, such as fully retractable undercarriage, faired tail wheel, full monocoque design with smooth skin covering. Despite its relatively small size—59 feet—and high speed, the bomb load is reputed to be 2,000 pounds. The DO-17 is a small sister to the four-motored DO-19, a ship similar in size and performance to our own YB-17 Flying Fortress.

FIRST FLIGHT IN A HANG GLIDER

By DON STEVENS

Bob Morse, who lives in Los Angeles, has been building hang gliders for six years, and has just completed a new biplane model. He had been testing it the two Sundays previous and had not been able to fly it over a few feet off the ground. The wind was not blowing hard enough and you had to run too fast to get off.

On this bright sunny Sunday morning, I decided to drive down to Redondo Beach to see if anyone was going to fly. I met Bob Morse there and he talked me into taking his hang glider up to the hill with my car.

We loaded it onto the trailer all as-

sembled. It weighs 120 pounds complete. On the way up to the hill, Stan Corcoran drove up alongside of us with his Cinema glider.

"Are you going to fly?" we yelled.

"Not unless the wind picks up," he said. There was practically no wind.

We went up to the Palo Verde hills, which are 800 feet in altitude, and Bob immediately found a swell hill to fly from. It was about 100 feet high and sloped off rather steeply down to a boulevard. A little breeze had picked up, blowing right up the hill. We carried the glider to the top and Bob strapped himself in and got all set. He uses his

legs to take off with and then sits down on a seat as soon as the ship leaves the ground. He puts his feet on two stirrups which project out on each side of a small bicycle wheel in front of the glider.

I trotted on down the hill to give him the signal when to start. The wind picked up and at my signal he leaped forward and ran as fast as he could. Much to my surprise, when he came to the brow of the hill, the glider soared straight into the air, instead of coming down the hill. He glided and sailed for what seemed a long time. He flew all the way down the hill, a distance of 800 feet, and landed.

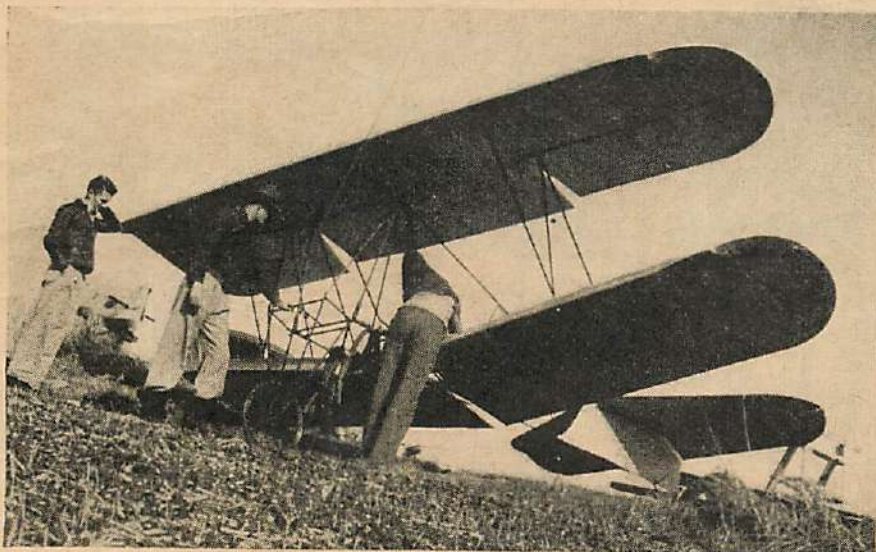
You have never heard a fellow yell so much in your life. He had built hang gliders for six years and his dream had finally come true. This was his first flight in one of the ships. He was bubbling all over with enthusiasm. He said, "Now you try it, Don."

I wanted to, as I had tried everything else but had never flown a hang glider before. So we wheeled it back up to the top and I proceeded to get in the framework. After much difficulty in dodging braces and tubing, I was strapped to the seat, which is a bicycle seat. The glider rests on a small bicycle wheel in front and a tail skid in back. First I had to put on the harness. It fits around you at the waistline and cinches up very tight and pulls you to the seat—like a safety belt. Mind you, all the time I am standing up straddling this seat with the wheel up in front taking the weight of the glider. Next came the harness for the controls, which slides over your shoulders like a vest. A regular stick is just behind your back which operates ailerons and elevators. Ailerons are on the top wing and very large. The elevator is of conventional type and large, and a stabilizer like our regular glider. There is no rudder, just a very large fin.

I tightened the control harness and then tried moving (Turn to page 79)

The Bob Morse hang glider being prepared for the takeoff from the Palo Verde hilltop from which successful flights were made.

A closeup of the glider showing the single wheel landing gear and tail skid. Morse on the left and author behind





OFFICIAL SENIOR N.A.A. NEWS

What the Tampa Chapter of the N.A.A., public spirit, and the W.P.A. can do to produce the last word in airports. This is the big Davis Island Airport.

*Developments in the nation's aviation activity
as seen by the National Aeronautic Association.*

Prepared by **WILLIAM R. ENYART**, Secretary N.A.A.

NURSES TAKE WING

Consisting of trained medical personnel and skilled airplane crews for helping those in distress, the Aerial Nurse Corps of America is carrying on a work that is intensely dramatic. When a life hangs in the balance and minutes mean the difference between recovery and death, you will find these humanitarian workers very much on the job. The corps is working toward becoming a national division of N.A.A.

Credit for the idea of these wings of mercy goes to Lauretta M. Schimmoler, who is largely responsible for organizing the unit. Broadly defined, it consists of physically qualified and technically trained registered nurses banded together for duty at air bases and in air transports, air ambulances, and flying hospitals. It is not merely an informal volunteering for air duty, but an

association of women professionally qualified in the specific and rigid requirements of nursing in the air. From this central purpose radiate many aims calculated to broaden the organization's scope of usefulness to the nation.

It is planned that the national structure of the organization shall be in three wings, which are the major geographical divisions of the country. Each wing contains further regional sections termed divisions, with a regional headquarters in a major city of each division. The establishment of companies of nurses within any city within a division is open to any group of registered nurses between 21 and 35 years of age who will follow the program required to become properly qualified to perform nursing duties in the air. Other forms of membership, both nursing and non-nursing, are available.

Each company of the Aerial Nurse Corps consists of a Medical Department, a Communications Department, and a General Detail Unit. In the Medical Department are 30 registered nurses, and 18 assistants, whose duties are to perform first-aid work, otherwise assist nurses, and handle clerical detail. The Communications Department consists of four licensed radio operators and two assistants possessing some knowledge of radio. In the General Detail Unit are two dietitians, two messengers, and 24 "K.P." workers.

The personnel of the organizations is made up of both active and associate members. Active members must be registered nurses, pilots, and licensed operators and physicians. Associate membership is open to unregistered graduate nurses, senior student nurses of recognized training schools for nurses, and persons who have distinguished themselves in allied medical, aeronautic, and social sciences.

In addition to speedy extension of the Aerial Nurse Corps all over the country, the organization has a number of immediate goals. They are:

1. Establishment of divisions in at least one major city of each state.
2. To maintain field hospitals and emergency rooms at all sanctioned air races, and at all major air meets and air shows.
3. To improve

and increase air ambulance service over the country, including making available to the medical profession proper and adequate air nursing facilities, with special attention to the proper protection of patient, pilot, and other passengers.

4. To establish definite requirements for personnel who fly in air ambulances, especially physical and technical qualifications.
5. After adequate testing and proving of the organization's principles of operation, to present the Aerial Nurse Corps of America to the American Red Cross for assignment in emergencies.
6. Recognition by Army Nurse Corps and Army Air Corps.

To cite several examples of the work already accomplished, during the National Air Races at Los Angeles in 1936, local companies provided a field hospital in which aid was rendered to 220 persons. Again present at the 1937 races at Cleveland, the Aerial Nurses assisted 108 persons. Other events during
(Turn to page 84)

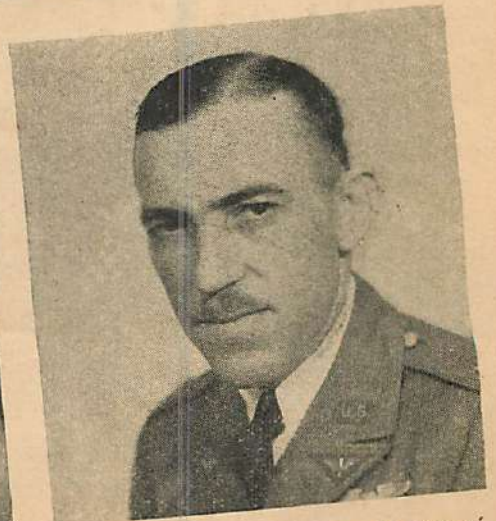
Members of the second N.A.A. Air Tour of Louisiana, in which forty-five airplanes participated. A great success.



Mr. Arthur S. Dudley, Secy.-Mgr. of the Sacramento, Calif., Chamber of Commerce.



Colonel J. Carroll Cone, Mgr. Atlantic Division of the Pan-American Airways.



Colonel Floyd E. Evans, State Director of Aeronautics for the State of Michigan.

"I would like to fly, but I'm afraid I'd be an awful dud. Somehow I just don't seem to do things like that well. I'm not considered a great athlete and I hate cars and motorcycles, and yet—I'd like to fly. What chance do you think I have?"

This question with several variations has been put to me so often I think it is about time it was answered. I have always been somewhat amazed at the number of people who *want* to fly, but can always find some personal reason for not trying it.

The great mystery about piloting is the number of trick twists put to it by people who have never flown. They somehow always see air pilots as strange young gods, a race apart. Pilots appear to be supermen to those who have never handled a stick. Yet if the truth were known, the art of flying is one of the most natural gifts to those who have all the normal functions and muscular reactions.

My old flight commander, a man for whom I had a great deal of respect, used to greet new pilots with a smile. He never bothered much about their log books or their training school records. He used to say to them: "Glad to have you, young fellows. You're lucky to get out here with our lot. We're very good, you know. By the way, do you ride, fence or play the piano?"

I'm afraid these newcomers were under the impression our major was something of a nut. They would look at him queerly, doubtless wondering what riding, fencing or playing the piano had to do with it.

The major would smile, and usually went up and grabbed one of the newcomers by the wrists, staring at his hands and making a quick but generally correct judgment.

"I like hands," he would say. "Good hands. Pilots need good hands today. Horsemen, fencers and most piano players have good hands. I like hands, gentlemen. That's all. You can do a little back-area flying this afternoon, just to get your hands in."

What went in 1914-18 goes today in flying. The best pilots, whether they be air line transport or week-end light plane pilots, are men and women with good hands.

Have you ever noticed auto drivers with what we will call good hands drive a car? They don't grip the wheel until the knuckles of their hands go white. They somehow seem to just rest their fingertips on the lower segment. They never seem to turn the wheel, they seem to stroke it and the car responds with greased grace. It's the same when they shift gears. If you are riding in the back seat and close your eyes you can't tell when a gear is being changed. That's the ultimate in good hands, and air pilots need this skill more than any other profession in the world.

light plane

*Who makes the best light plane
importance to the man in the
esting opinion of considerable*

conducted by

send in your notes,

Many people are under the impression that great pilots are great athletes and strong men with the reflexes of a bullfighter. In my experience over a number of years, that has not been the case. Looking back I can see hundreds of men who trained or flew with me, and one thing stands out about each one who was a really good pilot. A composite picture of my good pilot is

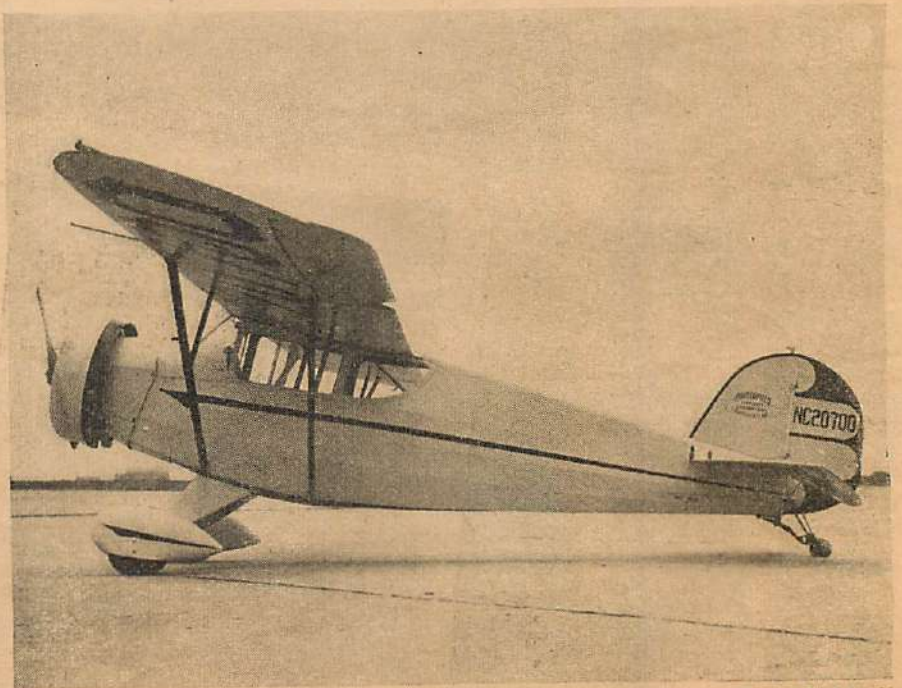


Photo by Rudy Arnold

The latest Porterfield, powered by the 90 h.p. Warner, cruises at 125 m.p.h. and has a top speed of 140 m.p.h. Engine has special cowling. Ought be a popular model.

flying clubs

pilot is a question of primary street—here is offered an inter-import drawn from observation.

arch whitehouse

news and snapshots.

that he may be of any height, and perhaps slightly underweight. He does not talk much about flying but is actually wild about it. He is not a great athlete in the accepted sense, but an ordinary individual who simply plays games for the fun of it. And generally always he has *good hands*.

Don't get me wrong. I'm not referring to hands with

long slender tapering fingers, ladylike wrists and perfectly mooned fingernails. The size has nothing to do with any particular skill. Good hands are those that respond quickly but gently to the command of the brain. Expert horsemen have good hands. Fencers always have good hands and particularly flexible wrists, and they usually make competent pilots. Most women, especially those adept at some accepted sport, have good hands, and for that reason I am amazed that so few of them actually go in for flying.

Good hands are most necessary for light plane flying, for as many pilots have told me time and time again, if you can fly the modern light plane well you can fly *anything*. This does not mean, of course, that the light plane is hard to fly. Almost anyone can learn to take it off the ground, fly it to a given point, and put it back on the ground again. But that in itself is not flying. There must be that smooth, certain movement from the control stick that makes flying a beautiful graceful motion. Once you get that you are a pilot, and not until. You may have a log book full of hours, but until you have learned to use your hands you cannot consider yourself a good airman.

No great strength is necessary. The average light plane is reasonably light on the controls. A steady grip on the stick is more than enough, and she should answer your commands and go through practically every normal movement without any great display of brute strength. In other words, don't make flying hard work.

THE DANGER POINT

And speaking of skill in the air, I have often wondered what was the most uncertain period in a young pilot's flying career. At first, like many others, I was under the impression that most pilots pass through their most dangerous time during their first five hours of solo flying. According to authentic records, this is not the case.

I asked a well-known pilot about it one day last week and he smiled and pointed to a long white scar above his left eyebrow.

"There's my five-hundred-hour badge," he grinned. "That's when we all come a cropper."

"What do you mean, five-hundred-hour badge?" I asked.

"Just that. Most of us get by the early stages because we are very careful, but after two hundred hours flying is something of a drudge if we are in the game professionally. By the time we have reached the five hundredth hour we are all wise guys, and that's when the Old Boy is waiting for us."

"Does that happen often?" I asked.

"Often? Go take a walk around the field and ask every guy who has flown about a thousand hours (*Turn to page 87*)



Photo by Rudy Arnold

How to enter the new two-place Cub. With the 40 h.p. Continental top speed is 85-90 m.p.h., cruising 70 m.p.h. Doorway is unusually large, and very convenient.

GLIDING AND SOARING

The Elmira Contest

This year the National Soaring Contest was without doubt the most successful event of its kind ever conducted not only in this country but also in the world. This statement was made by Peter Riedel, Germany's soaring ace and the winner of the contest. Twice the American distance record was broken. Twenty-four flights of over 100 miles were made as against seven of last year. Of these 24 flights three were over 200 miles, five exceeded Dick duPont's longest contest flight of 158 miles, which for a number of years stood as the American distance record, and a new official American altitude of 6700 feet was established. Seven pilots got their Silver "C" certificates, compared with two last year.

Twenty gliders and 59 pilots entered the contest. Of these 15 ships and 22 pilots exceeded the minimum performance and flew a total of 5,841 miles in 60 flights, thus averaging 97.3 miles per flight. Last year the total mileage flown was 2,224, with 147 pilots and 54 soaring craft entered.

Peter Riedel averaged 166 miles on goal flights against an average of 100 for the outstanding pilot at the best German contests. His average distance for all official flights was over 100 miles as compared to 71 at the International meet. The longest flight at Elmira was 225 miles as against 180 at the foreign contest.

Four ships of new design were present. More had been entered, but did not get finished in time. All ships were in the high-performance sailplane class. Two entries of great interest were a two-place sailplane designed and built by the Schweizer Metal Aircraft Co.



Lieutenant Chester C. Cross presents the Air Trails Trophy to Jay Buxton, who accepts it on behalf of Robert Stanley, the winner.

Robert checks his barograph at the Elmira meet before one of his many record-breaking flights in the sensational Stanley sailplane.

of Peekskill, N. Y., and the Stanley sailplane, with metal monocoque fuselage, which featured a retractable landing wheel. This was flown by Robert Stanley, who won the Air Trails Trophy.

The meet definitely proved that in ability to fly, design and build high-performance craft, American motorless experts are gaining on if not rapidly overtaking their foreign competitors.

Officials at the 1938 meet were as follows: Contest Manager, Earl Southee; Contest Director, Carl Lange (also in charge of the Harris Hill Meteorological Station); Flight Officials, Arthur Lawrence, R. E. Franklin, Jay Buxton, J. C. Funk; Official in Charge of Barographs, Victor Saudek.

CONTEST LOG

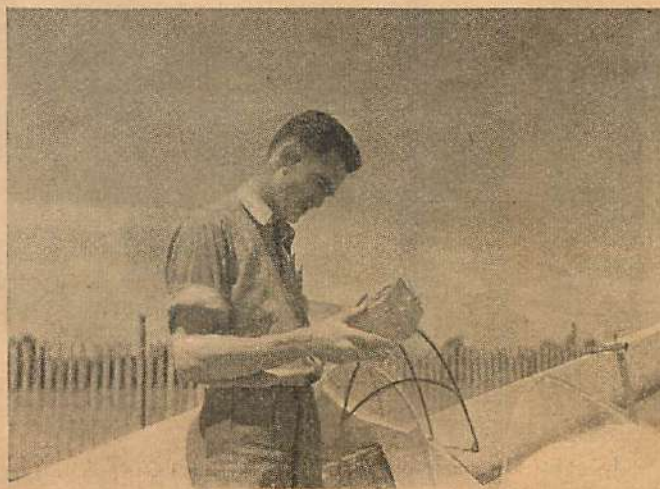
The contest opened officially at 3 p. m. on June 25 with an invocation by the Reverend Henry White. The principal speaker at the ceremony was Dennis Mulligan, Director of the Bureau of Air Commerce. Following his talk there were short speeches by Mayor Beers of Elmira, William McGrath, President of the Elmira Area Soaring Association, Arthur Silter, President of the Elmira Association of Commerce, Earl Southee, Contest Manager, Arthur L. Lawrence and Richard duPont, of the S.S.A.

At 3:30, while the boys were getting ready to start their first official flights, a terrific storm broke, causing all activities to be called off. The rest of the day was spent in "hangar flying."

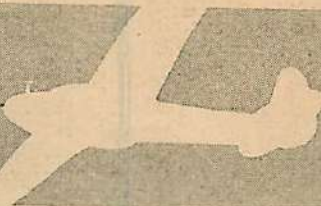
June 26. Rained all day. Carl Lange, Contest Director, gave a lecture on meteorology during pilots' meeting.

June 27. Weather still unfavorable. Short flights made by duPont, Riedel, Stan Corcoran, Don Stevens and Robert Eikenberry.

June 28. The weather man smiled at last. Soaring conditions greatly improved, and Harris Hill buzzed with activity. Peter Riedel, flying his two-place Kranich,



Conducted by Alexis Dawydoff



landed at Kylerstown, Pa., 103 miles away. Lehecka in his Rhonsperber, made a goal flight to Roundtop, Pa., a distance of 34 miles. Dick duPont and his Minimoa landed at Caton, N. Y., his distance being 35 miles, altitude 4220 feet. Jack O'Meara in the Baby Albatross reached an altitude of 4230 feet, and Floyd Sweet in the Rhon-Buzzard 3690 feet.

June 29. This was the best day of the contest in regard to aggregated distance flights. Stan Corcoran of Hollywood, flying his Cinema sailplane, landed at Havre de Grace, Md., a distance of 183 miles. Peter Riedel came down at Wilmington, Del., 178 miles, Chet Decker in his Minimoa at Gladwin, Pa., 170 miles, Robert Stanley in the Stanley sailplane at Reading, Pa., 144 miles. Reaching an altitude of 6700 feet, Richard duPont flew 155 miles to Lancaster, Pa. Jack O'Meara went 88 miles to Sunbury, Pa., the German pilot Alfred Bayer in a Kranich 64 miles to Evans, Pa., and Stan Smith in his two-place City of Utica sailplane, with Mike de Medeo as passenger, broke the American record for distance with passenger, flying to Troy, Pa., 28 miles. Total distance flown on this day was 1121 miles, or just half of the total distance of last year's meet.

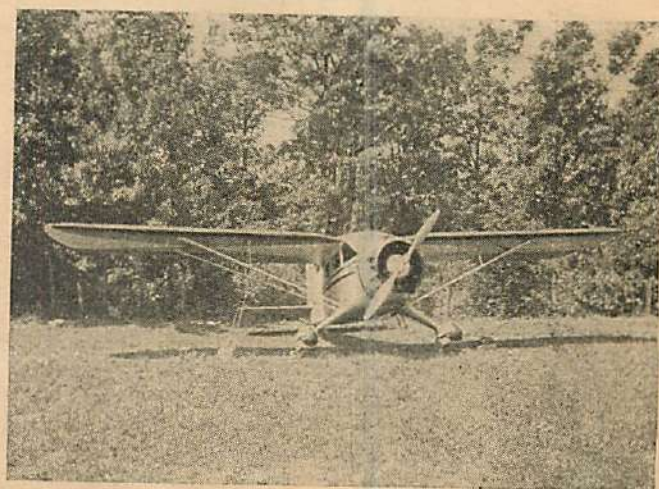
June 30. Because of weakness of thermal conditions at low altitudes, most launchings were done by airplane tow. Good thermals were found at 1500 feet. Emil Lehecka flew 89 miles to Central Square, N. Y., Warren Merboth 94 miles to E. South Bay, N. Y., Floyd Sweet 84 miles to Brewerton, N. Y., Jack O'Meara 73 miles to Syracuse, N. Y., Alfred Bayer 59 miles to Cincinnati, N. Y., Robert Stanley 38 miles to Richford, N. Y. A distinguished visitor at Harris Hill was Colonel Monroe Johnson, Assistant Secretary of Commerce.

July 1. No notable flights were made due to weak thermal conditions and constant wind shift. Dr. Eastman Jacobs and Mr. Platt, engineers for the N.A.C.A., installed accelerometers (instruments for measuring strains imposed on sailplanes by air bumps and sudden

maneuvers) in Riedel's Kranich, O'Meara's Baby Albatross, and the Soaring Society's Ross sailplane. Short flights were made by Peter Riedel, Chet Decker, Richard duPont, Bob Auburn, in his beautifully painted Sun Spot, Dana Darling, and Don Stevens. A radio-controlled model sailplane was flown by Ross Hull.

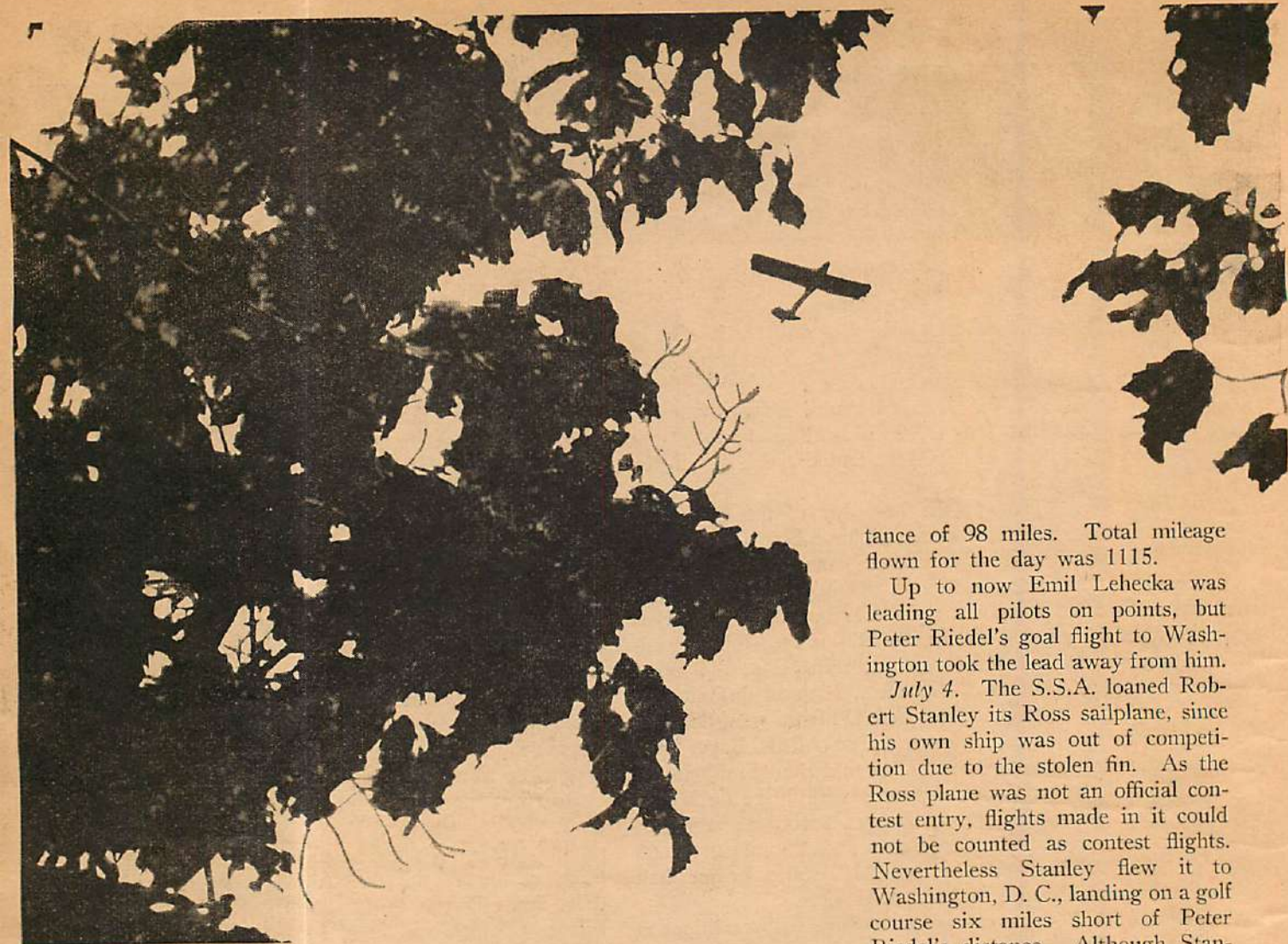
July 2. Peter Riedel, flying his Kranich, landed at Harrisburg, Pa., his goal, 13 miles away. Bob Stanley completed his Silver "C" requirement with a flight of 122 miles to Delaware Water Gap, Pa., where some moronic souvenir hunter stole the elevator fin from his sailplane, thus putting Bob out of competition. Dick duPont did 81 miles to Shickshinny, Pa., Chet Decker 28 miles to Wilkes-Barre, Pa., Julian Hadley, flying his Albatross, 38 miles to Grover, Pa., Emil Lehecka 38 miles to Canton, Pa., and Alfred Bayer, with passenger, 25 miles to Troy, Pa. Bayer's ship was damaged on landing in a rough field and was taken to the Elmira Ground School for repairs.

July 3. Peter Riedel set out in the morning for a goal flight to Washington, D. C. After 7 hours and 19 minutes Peter reported by telephone that he had landed safely at the Washington Airport, Arlington, Va., 225 miles from Harris Hill. Stanley Corcoran gained his Silver "C" with a flight of 146 miles, 4040 feet altitude, and duration of 6 hours and 23 minutes, to Shippensburg, Pa. Other pilots to win their Silver "C" were Warren Merboth, 98 miles to Port Trenton, Pa., and Ted Belak, flying the S.S.A. Ross sailplane, 45 miles to New Era, Pa. Emil Lehecka flew 137 miles to Elizabethtown, Pa., Floyd Sweet 133 to Harrisburg, Pa. Jack O'Meara made a goal flight of 133 miles to Harrisburg, and Dick duPont landed at Fleming, Pa., a dis-



Lieutenant Cross' Stinson in which Air Trails flew to Elmira staked down for the night after a few assorted thunder storms enroute.

Our genial friend, Stan Corcoran, another high scorer at the Contest, turns on famous Corcoran smile across Cinema's nose.



tance of 98 miles. Total mileage flown for the day was 1115.

Up to now Emil Lehecka was leading all pilots on points, but Peter Riedel's goal flight to Washington took the lead away from him.

July 4. The S.S.A. loaned Robert Stanley its Ross sailplane, since his own ship was out of competition due to the stolen fin. As the Ross plane was not an official contest entry, flights made in it could not be counted as contest flights. Nevertheless Stanley flew it to Washington, D. C., landing on a golf course six miles short of Peter Riedel's distance. Although Stanley

exceeded the U. S. distance record he did not exceed it by the required five per cent to make it official. His distance was 219 miles. The next longest flight was made by Chet Decker, who flew 173 miles to Nova, Md. Emil Lehecka made a flight of 130 miles to Harrisburg, Pa., Jack O'Meara a goal flight of 35 miles to Towanda, Pa., Floyd Sweet 37 miles to Sweetbrier, Pa. The Airhoppers' two-place all-metal Schweizer sailplane arrived, brought by Arthur Ramer and Jack Brookhart, and was flown by Jack in a fine stunting exhibition for the benefit of Milt Girton of the Department of Commerce. Julian Hadley won his Silver "C", staying up for 5 hours and 22 minutes.

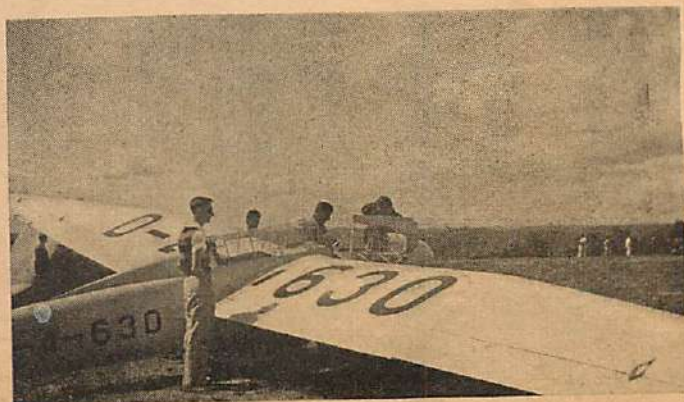
July 5. After careful consideration Peter Riedel se-



The champion dons his 'chute. Emil Lehecka, the National Champion, prepares to annex more points in his high-performance ship.



The Soaring Society's Ross Sailplane gets the once-over by Ted Bellak prior to taking off on a cross-country flight from Elmira.



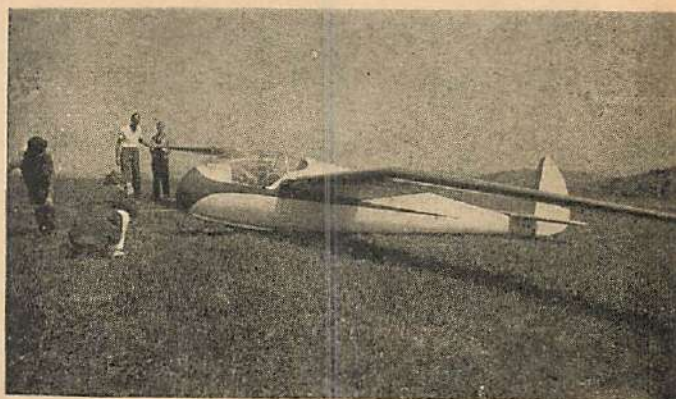
Next stop Washington, D. C.! Peter Riedel readies his motorless craft for his splendid flight of 225 miles to the nation's capital.

lected Roosevelt Field, Mineola, N. Y., as his goal and landed there after a flight of 7 hours, 19 minutes, the distance being 196 miles. Richard duPont attained an altitude of 6,700 feet, establishing an official altitude record. Jack O'Meara covered 115 miles from Harris Hill to South Kortright, N. Y., Decker 115 miles to Pond Eddy, N. Y. Auburn fulfilled his Silver "C" requirements with a flight of 78 miles to Wilkes-Barre, Pa. Emil Lehecka flew 42 miles to Le Raysville, Pa., Floyd Sweet 52 miles to Rushboro, Pa. Sweet's altitude of 5580 feet won him his Silver "C" certificate. Warren Merboth made 93 miles to Honesdale, Pa. Contest officials Earl Southee and R. E. Franklin made short flights in the Airhoppers' new two-place Schweizer sailplane. Short flights were also chalked up by Ramer, Brookhart, Dusenberry, and Stanley Smith.

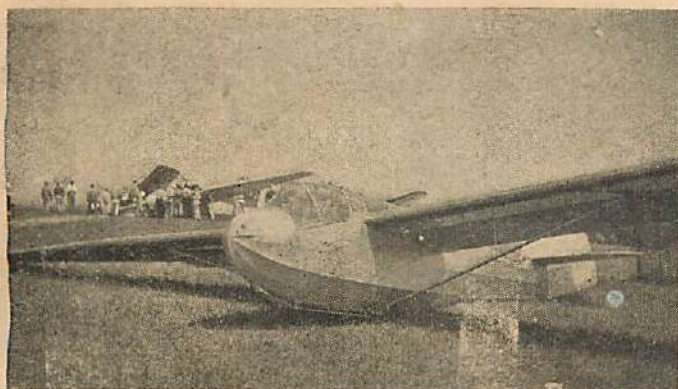
July 6. Stan Corcoran made the third longest flight of the contest, 202 miles, landing his Cinema at Cecil, N. J. Richard duPont made 82 miles to Vicksburg, Pa., Merboth a goal flight of 62 miles to Williamsport, Pa. Emil Lehecka soared the Schweizer two-place for an hour and a half. An aerobatic exhibition was put on by Cleveland Hyde and Youston Sekella for the huge crowd gathered for the annual Combined Service Clubs picnic. Movies of gliding and soaring were later shown to the picnickers in the hangar.

(Turn to page 83)

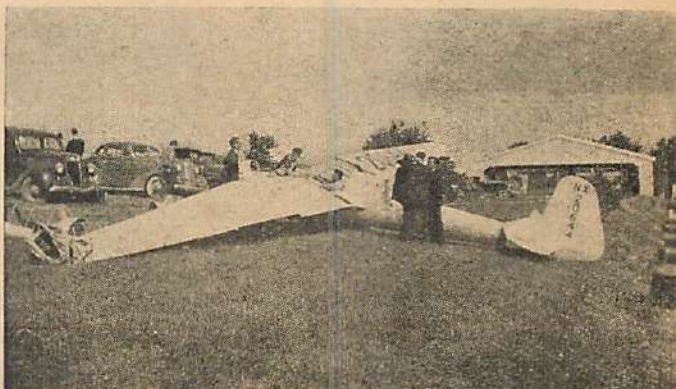
An intensely interested spectator of every angle of the National Contest was Lieutenant-Colonel R. E. Olds, D.F.C., who recently led a flight of six Flying Fortresses on a remarkable Good Will flight to Buenos Aires, participating in inauguration of President-elect Ortiz of Argentina.



A Silver "C" pilot in the making. Ted Bellak about to take off on his flight to New Era, Pa., which won him this coveted award.



The Airhoppers Gliding and Soaring Club of Hicksville, L. I., N. Y., brought with them the two-place all-metal Schweizer soaring ship.



Alfred Bayer's German Kranich draws plenty of attention from both contestants and spectators. This was one of several two-place ships.



The Air Defense League.

Greetings, Air Adventurers!

For years now we have been carrying on our quiet campaign to make America air-minded. For years we have all done our best to put aviation over. We have talked the science up and we have induced our faint-hearted friends to fly whenever possible, and we have all tried to do our bit toward maintaining the public morale whenever aviation has suffered any setbacks.

And now we have an opportunity to do even more.

In the past few months, many of us who are able to read constructive reports, whether they have been published in newspapers or magazines, have come to the stunning realization that all is not well with the air defenses of the United States. An organization called the Air Defense League is actively engaged in trying to remedy this condition. A message by its president was published in the last issue of *Air Trails*.

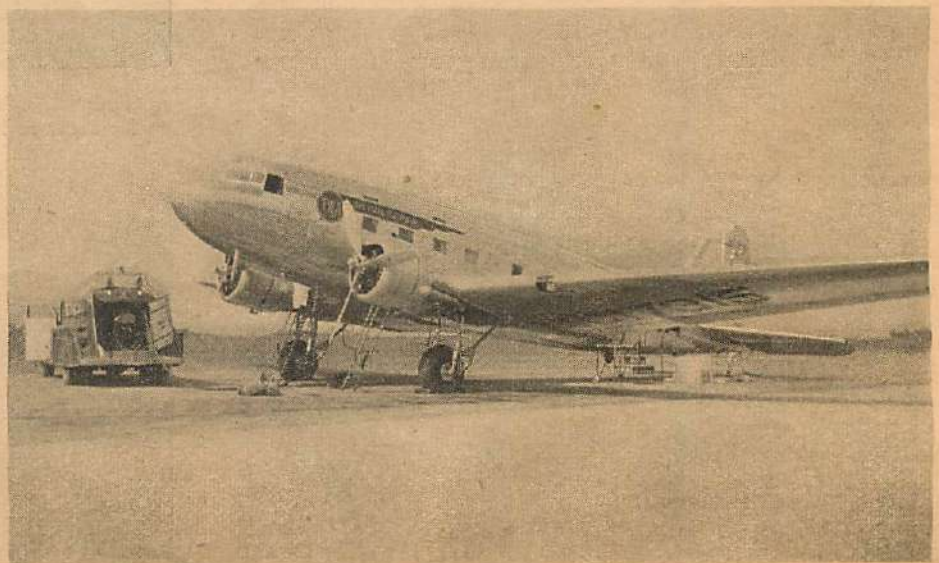
The Air Defense League was organized as long ago as 1930 in Philadelphia by a number of patriotic citizens who believe that through adequate air defense the peace of the country will be most effectively and economically protected. It is a non-profit organization and all funds received by the League from memberships and contributions are devoted to the effective furtherance of maximum peace at a minimum cost to the taxpayer. No person who is an officer or an employee of an aircraft manufacturing or aircraft engine company may become a voting member of the Air Defense League. Army and Navy officers may not hold office or voting privileges in it.

A new campaign is about to start and we sincerely hope that all Air Adventurers will fully consider the

aims and objectives of this fine organization. If you believe that the United States should have an "Air Power" and not simply a number of small "Air Arms" attached to the Army or the Navy, you should take an interest in the Air Defense League.

The aims of the League are not to ridicule the present personnel or the available equipment. It is hoped that by nationwide campaigning something will be done to increase the number of fighting planes available, better the conditions of the trained personnel and enlarge the number of available reserves.

We do not wish to give the impression that we are trying to switch the interest of Air Adventurers from our regular program of training, model-building and general aviation advancement. We have been officially advised of the Air Defense League, and we have studied its program and feel that all Air Adventurers should be told about it. Those of you who are interested are hereby informed that the offices of the Air Defense League are Suite 310, Bellevue Stratford Hotel, Philadelphia. The coming campaign for membership will soon be noticed in all the leading magazines and periodicals. Suitable lapel emblems and metal plaques for automobiles will be available in the near future.



For grand composition and detail this picture of a TWA Skysleeper deserves merit. Rudy Young of Ambridge, Pa., took the photo at the Pittsburgh County Airport. Note size of the gasoline truck.

The Air Defense League is just another opening for Air Adventurers who are loyal citizens. It gives them an opportunity to do something constructive toward the building up of an adequate air defense body. Anything you may do toward aiding the men who are working on this great problem will only add more glory to the Creed of Air Adventurers, and while you are about it, don't forget the coupon in opposite corner. If you have a few friends who should be in on all this, clip it and have them sign on the dotted line. Don't forget, we shall offer more news on the Air Defense League also, so stick with us, and we'll all work hard to give America a defensive air force second to none. Your Flight Commander,

ALBERT J. CARLSON.

CLUB NEWS

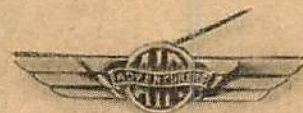
And now for the regular business of the month.

Reg Hind of Winnipeg, Manitoba, is in bed with a dislocated hip, but he has been on his toes enough to keep up his good Air Adventurer work. Reg did a swell drawing of a Clipper making a landing on water. He managed to get in a remarkable effect of reflection and we only wish it had been done in suitable drawing ink so that it could be reproduced. For the benefit of those of you who draw we might give out this information. Any drawing intended for reproduction should be done on clean white paper, preferably illustration board or Bristol. Black India ink is best. Do not draw on lined paper and do not fold it.

Here's a new one. Dauvergne de Jersey Gerit of Palo Alto, Cal., has made the suggestion that we institute a Bill Barnes Medal for Valor. He adds that it could be awarded to Air Adventurers who perform special acts of bravery or who do something special for aviation. Have you any person in mind, Dauvergne?

Harry Lavington of Lidcombe, N.S.W., Australia, is one of our new members. He's a great model builder and is now working on an Electra and later intends to do the Gulfhawk, as shown in our model pages.

A new Airplane Mechanic is Oliver L. Davidson, Jr., of Baltimore. Oliver sends in a nice picture of a Ryan S-T he has built and which recently won first prize in the Baltimore Hobby Show. He won a blue ribbon, a gold medal and fifteen dollars which about puts him in



Actual size of your Air Adventurers pla.

(MEMBERSHIP COUPON)

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

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

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

Name Age

Address

☐ Check here if interested in model building.

(This coupon may not be used after November 15, 1935.)

the professional class, eh? He tells us that there are more than two hundred parts in the engine, which had moveable pistons.

Another Airplane Mechanic award has gone out to Norman Dauber of Toronto, Ontario, for the splendid model of a Martin Bomber he sent us. Normie, as he is known to his pals, has built twelve solid models and a Beechcraft flying model. He has a Hawker Super-Fury on his construction board now.

Rudy Young of Ambridge, Pa., recently visited the Pittsburgh County Airport and took a number of snapshots of aircraft there. He has sent us three, all of which are very good. He uses a Brownie box camera and gets some remarkable results.

One of our new members is George Kramer of West Allis, Wis., who has been a model builder for years. In the last few years he has made a good living out of model making and around Christmas time he is usually swamped with orders for model planes. He is very generous, too, for he often gives models away and starts another prospective member on the right road. Good work, George.

We have a Diesel engineer in our ranks now. James D. Moseley of Los Angeles was a little afraid he was too old to get in, but read about Mr. Laing of Joliet, Ill., who is 41, so he sent in his coupon at once. Mr. Moseley, who has been connected with Diesel engineering for years, has turned his attention to the possibility of using Diesels in aircraft. Well, the field is wide open, (Turn to page 86)



This Waco with a 225 h.p. Jacobs engine does two round trips daily between Victoria and Vancouver, British Columbia. It's about 80 miles, according to Cliff Carter, who sends us this picture.

WHAT'S YOUR QUESTION?

By Clyde Pangborn

Question: How much education is required to become an aviation mechanic in the Navy? J. P. Hauston, Miss.

Answer: Navy aviation men are among the best in the world, and you must understand that most of them have been selected from the ranks of able seamen and trained. This should indicate that men with a fair education, a couple of years of high school at the least, stand the best chance to get their promotions. There is no particular educational standard demanded, but the more you have the better your chances.

Question: What is all the mystery about the Bell Aircuda? We have heard nothing much about it for several months now. R. B.

Answer: Since the plane has been undergoing stiff tests at Wright Field, little has been allowed to get out about it. Actually, of course, about thirteen have been ordered, and will be ready for squadron service in about a year. The holdup on the whole thing seems to be the problem of suitable weapons for the motor nacelles, for it is only just lately that the Army Air Corps has decided to use air cannon manufactured by the American Armament Corporation. I know nothing about the actual performance of the plane, but I understand that several improvements in the original model have been demanded.

Question: What is the secret of steam-cooling in aero engines? C. McF., Dorchester, Mass.

Answer: Steam-cooling is a phrase used to indicate a cooling system in which the water used may pass the boiling point. In such cases the cooling system is built to maintain some pressure and not blow off. For instance, some Rolls-Royce engines have this system of cooling, and the water naturally overheats, boils and bathes the sides of the cylinders with hot steam. While steam is hot, as you argue, it is still suitable for cooling the engine, for it passes through the circulation system, the radiator, etc., and in some measure heat is dissipated. The advantage of this type of cooling, of course, comes in the saving of weight and space in the radiator, which often turns out to be a big item in military planes designed for



interception work. The whole engine must be designed for this sort of cooling, of course.

Question: Can you tell me the name of the plane that holds the world's land speed record? J. K., Schenectady, N. Y.

Answer: The present official holder of the world's land speed record of 394 m.p.h. is the German Heinkel fighter, a low-winged monoplane using the 950 h.p. Daimler-Benz engine. This was not a regulation service job, but a souped-up model which in all probability turned out about 1,500 h.p. for the test.

Question: I am a machinist by trade. Do you know whether a small gasoline engine can be made for airplane models? If so, where can I obtain plans for one? F. L., Tarentum, Pa.

Answer: Your question comes under the head of "Believe It or Not". Don't you know that model planes have been using small one-cylinder gasoline en-

gines for several years? If you are a machinist, I should think you could turn a small one out, but you can buy one very cheap, if you will consult our advertising pages. I doubt whether any of the companies making these engines would send or give you a blueprint on their products.

Question: Where could I get a world map showing all the principal airports? J. N., Spokane, Wash.

Answer: I'm afraid one map carrying all that information would be out of the question, but all the big map makers carry atlases that show many of the principal airports. Try Rand and McNally or Hammonds in New York City.

Question: What is the best racing job in the light plane class? Can I get the blueprints and build it at home? What would it cost? F. J. Y., Tusculum, Tenn.

Answer: To answer your question straight, it should be pointed out that no regular light plane can be considered a racing plane. The same applies to the automobile. A stock car is hardly a racer, and racing planes in the lighter categories are usually special jobs, built to the owner's specifications. They include special wings, special motors set for aerobatics and single-seater racing cockpits. Probably the stock ship that most nearly fills the racing bill is the Ryan S-T, which can be purchased with a variety of engines, and for that reason it is impossible to state an exact price. If you bought such a plane you would have to give your specifications to the company and have them quote the delivered price. The possibility of your getting blueprints on such a ship and building one yourself is of course out of the question, for engineering firms can hardly be expected to spend thousands on designing a plane and then quietly give out working copies for all to manufacture.

Question: What is the value of twin rudders? Can you give me the addresses of the Cessna and Howard airplane companies? What is the top speed of the Seversky P-35 as compared with the Allison-powered Curtiss P-37?

Answer: Twin rudders are usually used on planes having (Turn to page 86)

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



THE CHARGER GOES TO SYDNEY

A COMPLETE BILL BARNES AIR NOVEL
BY GEORGE L. EATON

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

THE cacophonous roar of an airplane motor rolled across the fog-draped expanse of Barnes Field and into the open windows of the bungalow in which Bill Barnes was sleeping. The transverse bands of yellow-and-black pigment painted across the runways gleamed under the wings of a scarlet-and-black Snorter as it flashed down the field under the glare of the powerful floodlights.

The thunder of the twin Barnes-Diesels in the nose of the ship beat against Bill's subconscious mind like the piercing rataplan of a riveting machine. As the drone of the motors died away in the distance a sigh of relief came from his lips and he buried his face deep in his pillow.

Then his subconscious mind began that mad whirl of disconnected nightmares again. In his dreams he was riding a mysterious new ship down and down and down and down. He was fighting desperately to keep the nose pointed earthward, and the next instant he was fighting to bring it up. Cold perspiration crept out of his pores as the nose slowly lifted, and he saw that his ship still had wings.

He shallow-dived it again and circled the field below him to take it in for a landing. His imaginary hand worked the mechanism that would lower the retractable landing gear of the ghostlike ship he was flying. He was driving down into the wind, fishtailing a little to reduce speed, when he realized that the gear was still tucked up in the belly of the fuselage. He stared at the spot on his instrument panel where a green and a yellow light were supposed to tell him his gear was down.

Again cold perspiration bathed his body. He was so low now that if he tried to zoom upward he would crash head-on into the Administration Building on Barnes Field. At the last possible instant he nosed the ship up and rolled it over on its side. The belly of the craft almost scraped the corner of the building as he passed. Then he was climbing once more and fighting with the landing gear mechanism.

In his sleep he cursed the wraith that had been haunting him during his waking hours—the interchangeable landing gear he had been trying so desperately to perfect. And now, as in his waking hours, the thing eluded him. It faded away like some dancing wood nymph, away from the grasp of his mind and vision.

He threw his two hundred pounds of bone and muscle across the bed as the bell on his instrument panel buzzed to tell him the gear had started to lower. The clanging of the bell in his brain brought consciousness. He threw his arms wide and tried to shift his position to avoid the sickening odor that was in his nostrils.

"Damn him! He's like an eel," a muffled voice said above him.

Bill opened one eye and realized that his arms and legs were being held in a viselike grip. He saw a light flash in his living room and saw a dim figure moving between the three drafting tables he had set up there.

The hazy thought of the hundred and one rough pencil sketches and intricate mechanical drawings that littered the room floated through his anesthetized brain. He moaned in mental anguish as the pad of chloroform was pressed tighter against his nostrils. He tried desperately to fight off the unconsciousness that was overcoming him.

"There he goes," a voice said above him, and the world to Bill Barnes became a black void without feeling or thought. . . .

At precisely seven o'clock that same morning I. Kinter Hassfurth, Bill's chief of staff, but known to aviation circles the world over as "Shorty," climbed into the forward cockpit of his black-and-red-and-orange Snorter and gunned

the twin Barnes-Diesels. He was followed a moment later by Eric (The Red) Gleason, who had been his pal since they had started flying together over the French lines in 1916, and Beverly Bates, the Harvard-bred Bostonian who was the second youngest of Bill's flyers.

A few minutes later the three ships flashed down the center runway and whipped into the air in perfect formation. With Shorty at the point the three Snorters formed a compact little V, flying with their wing tips only a few feet apart. Up and up they climbed until they had ten thousand feet under them. At a signal from Shorty they dropped their noses and thundered downward to an imaginary target on Barnes Field. At two thousand feet they pulled up, circled high and dove again in the same formation. . . .

It was the frightful roar of their motors that first penetrated Bill's consciousness when he struggled with all his will-power to get his eyes open. The room rolled around him in a dizzy circle and his stomach seemed to tighten into a knot and climb into his throat to half-choke him. He clenched his teeth and focused his gaze on the telephone beside the bed. He tried to think but his mind was a mad jumble. Nothing would come clear.

He was aware he was in his own bed in his bungalow on Barnes Field, Long



He moaned as the pad of chloroform was pressed against his nostrils.

Island, but he couldn't remember what had preceded his unconsciousness. Thoughts danced like the pieces of a jigsaw puzzle through his brain. He fought to retain his senses as the room began to sway around him. He knew that he must get the telephone from its cradle and call for help.

He pushed one hand out toward the table and felt the edge. Inching his fingers along, he touched the base of the cradle. How long his hand rested there while he tried to gather enough strength to lift the instrument he would never know. He strained until the blood rushed back into his face and the veins pounded in his temples. But he could not raise his body or his hand. Finally, he jabbed at the instrument with the tips of his almost lifeless fingers. He felt it give and heard the crash as it struck the floor.

Then everything blacked out for him again.

When he recovered he heard feet pounding on the porch of his bungalow, and the clang of the field ambulance.

Then "Sandy" Sanders, the youngest of his little squadron of combat pilots, was bending over him, with Doctor Humphries, the field physician, by his side.

"Holy Moses!" Sandy said, his eyes bulging large and round in his freckled face. "What happened?"

"Shut up, Sandy!" Doc Humphries said as he opened his little black bag. "Get me a spoon."

Bill shook his head as the doctor braced him up with an arm around his shoulders and extended a half-spoonful of brown liquid toward his lips.

"Get it down, Bill," Doc Humphries said.

"It won't stay," Bill gasped. "Chloroform!"

"I know. They gave you plenty. Try to make it stick. Get me a small piece of ice, Sandy."

Bill gulped the brown liquid and thanked Doc Humphries with his eyes as he slipped a small piece of ice into his feather-lined mouth.

"Take it easy now, son," the doctor said, reaching for Bill's wrist. "Any idea who called on you?"

Bill shook his head again weakly, lifted one finger to point toward the living room. "In there, Sandy," he said. "See what they took."

Sandy's startled gaze jumped from Bill's face to the living-room door. His gasp of dismay was drowned by the voice of old "Scotty" MacCloskey, major domo and chief engineer, as he came in the room.

"What is it, boy?" he asked. His dour eyes were anxious as he gazed down at Bill.

"Plans for the new ship," Bill whispered. "You know what was there. See what they took, Scotty."

THE CHARGER GOES TO SYDNEY

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

"They took everything, Bill," Sandy said excitedly. "All your sketches and mechanical drawings."

Bill gulped and half-choked as the doctor held a powerful inhalant under his nostrils and told him to breathe deeply. After he had stopped choking he tried to swing his feet over the edge of the bed.

"Stop it, boy!" old Scotty said. He helped the doctor push him back.

Bill's eyes fastened on the ceiling for the space of two minutes. He stared at it without speaking. Suddenly, he began to grin as the color flowed back into his face.

"If I knew who they were," he finally said, "I'd thank them for the warning. I thought that this time I was going to be able to build a new ship without a lot of interference and trouble." He paused for a moment to get his breath. "But it's not in the cards. Before I even have it started someone is trying to steal it."

"They did steal it, Bill!" Sandy said. "They took everything."

"There wasn't anything there to take, kid," Bill said. "All those things were just rough drawings, thumb-nail sketches that wouldn't mean anything to anyone but me. Some of 'em don't mean anything to me. If they can put a ship together with that stuff they can do a better job than I can."

"You're sure?" old Scotty asked anxiously.

"I'm sure. The whole thing is still up here," Bill tapped his forehead. He looked accusingly at Scotty. "How the hell did they get in here?"

Old Scotty's face became the hue of an October sunset. He grumbled in his throat for a moment, then spoke intelligibly. "I don't know, Bill," he confessed. "I'm going to check all the guards and try to find out. They couldn't get in."

"No," Bill said, "I just dreamed it. They couldn't get in! Listen! I want you to double the guard and put 'em all on the alert until the new ship is finished. I don't want anyone snooping around here. That ship, when it's finished, has got to win the San Francisco to Sydney, Australia, air race. First money will pay for the cost of building it. If we don't win it the sheriff will be tacking a 'closed by an order of the courts' notice on our main gate and we'll all be out of a job."

"You're going to enter her in that

race, Bill?" Sandy said. The kid was goggle-eyed.

"Keep your mouth shut about it!" Bill snapped. "I've got to work out an interchangeable retractable landing gear before we can even start to build her. I've got to get the whole thing down on paper first."

"Listen, Bill," Sandy said, "I got a couple of swell ideas for—"

"All right! All right, Sandy!" Doc Humphries said. "I want Bill to get some rest now."

"But—"

"Come on, lad," Scotty MacCloskey said. He grabbed Sandy by the collar of his overall and began dragging him toward the door.

II—CONFERENCE

LATE that same afternoon Bill Barnes climbed out of bed, doused his throbbing head in cold water, and clothed his powerful body in loose gabardine slacks and a white sports shirt. Walking toward the Administration Building, his legs felt as though they each weighed a thousand pounds, and his mouth was still full of those feathers.

Going to the radio room, he said to brown-eyed Tony Lamport, who was superintendent of communications on Barnes Field: "Tell Shorty and Red and Bev I want to see them down in the cellar."

"Okay, fellah. You feeling all right? Better take it easy."

"I'm okay," Bill said. But he knew he wasn't. His head felt as though it was filled with helium and might float away at any moment.

He found young Sandy in the little office he used in the capacity of Bill's secretary. His desk was cluttered with twenty or thirty sheets of white paper on which he had made sketches. He glanced up eagerly as Bill came in the door.

"Look, Bill, I—"

"Come on down in my study," Bill ordered. "Shorty and Bev and Red will be there in a few minutes. I want to talk to you."

Bill went on into his own office, where he opened the door of an innocent-looking closet. Inside were coats on hangers and a shelf with two or three hat boxes. He pressed a concealed switch and the whole back of the closet swung open,

revealing a flight of steps leading downward.

Sandy followed Bill down the steps and into a brightly lighted passageway. At the end of the corridor an armed guard saluted them and unlocked a steel door. Bill produced a key similar to the one used by the guard and turned it in a second lock. The massive steel door swung outward, and they entered the bomb-proof secret study.

One wall of the well-guarded vault was occupied by a dozen steel cabinets that contained Bill's confidential plans, reports, and designs. The opposite wall was lined with the finest collection of *materia aeronautica* ever gathered together by one man. It was a library of technical books, scientific monographs—a few of them rare first editions, written by himself—and translations of works written by leading foreign aviation experts from almost every civilized country in the world. Against another wall was an enormous mahogany desk. Scattered around the room were four drafting tables and a half-dozen deep, comfortable chairs. The place was air-conditioned and lighted by an intricate set of indirect lighting appliances.

Sandy was trying to interest Bill in the half-dozen sketches he carried in his hand when the stocky, barrel-chested Shorty Hassfurth came through the door. His hard-bitten blue eyes began to twinkle as he fastened them on Sandy. He was followed by the carrot-topped Red Gleason and the brown-eyed, meticulous Bev Bates.

"How's the head now?" Shorty asked Bill without taking his eyes off Sandy.

"It's still there," Bill said.

"Any idea who called on you, Bill?" Bev Bates asked.

"Not the slightest. Nor how they got in. But they'll stick their chins out before long. They always do. They were after the plans of the new ship we've been discussing for the past year. Fortunately, I didn't have them down on paper because I haven't perfected the landing gear in my own mind as yet. That's why I called you all down here instead of up in my office. In the future we'll do all work on the new ship down here where we'll be sure it will be safe. Nothing is to be taken out of here at any time. I—"

"Listen, Bill!" Sandy said. "I wish you'd look at these sketches I have here. I've got an idea that—"

"Let's see it, kid," Shorty said.

Sandy gazed at him suspiciously for a moment, then handed over one of the sketches. He wouldn't have shown it to Shorty another time, but now he was anxious for any kind of attention.

Shorty held the thing away at arm's length and turned it around and around while he squinted at it. A smile twisted the corners of Bill's mouth while he watched him.

"It looks all right to me, kid," Shorty finally said, "but I don't see any horses."

"Horses!" Sandy's face began to turn red as he reached for the sketch.

"Certainly!" Shorty said. "I saw one somewhat similar to this down at Hialeah race track at Miami. They put each horse in a separate stall and lift the barriers simultaneously so they'll all get off at one time."

"Listen, you fat-headed Dutchman!" Sandy stormed. "That's a sketch for an interchangeable retractable landing gear. It works on the principle—"

"It is?" Shorty said in mock surprise. "Where's the ladies' haircurler? Suppose your best girl falls off the pontoon and gets her hair wet? You ought to think of those things, kid."

"Listen!" Sandy said between clenched teeth as he snatched the sketch out of Shorty's hand. "Some day I'm going to knock—"

"Sit down, Scotty," Bill said. "I want you to hear this too. I'm just laying the cards out on the table. As a matter of fact, we're damned near broke!"

"What's odd about that?" Shorty wanted to know. "We've been broke before. We didn't miss any meals."

"No," Bill said, "we didn't miss any meals. But this is different. We have a terrific overhead now and a big payroll to meet. Our last few jobs haven't paid us much money. I've had to go to the banks to borrow. What we've got to do is create new business. We've got to do something to attract attention to us again. I've arranged a loan to tide us over until we can build the new ship. But when it's built we've got to make it pay for itself. Do you get the idea?"

"The San Francisco-Sydney air race!" Sandy couldn't help saying.

"That's it," Bill said. "First money



"Better men than you have tried to stop Bill Barnes," said Lucas.

"Shut up!" Bill snapped. He glared Sandy into an unwilling silence. "I want to explain what we're up against around here. 'Things'—he picked up a packet of paper matches and began to break them in half between his fingers—"things aren't all they should be."

The foreheads of the four men wrinkled in surprise as Scotty MacCloskey came into the room. They were all watching Bill intently.

is \$100,000. We've got to finish the ship in time to win it. The resultant publicity will bring us new business. I've never gone after publicity—have tried to avoid it. But right now we've got to get it.

"In some way word has leaked out that we are going to build a new ship. One of the fly-by-night mobs that don't do aviation any good heard about it. They also have their eye on that \$100,-

000. That accounts for their visit last night. I want you all to keep your ears close to the ground and see what you can learn. One of you will pick up some word as to who they were and then we'll know in which direction to keep a watch.

"In the meantime, we've all got to keep our nose to the grindstone until the ship is completed. As you know, I ordered a pair of high-performance Diesels from Germany and they ought to arrive at any time. We'll have them redesigned to function normally while lying on their sides. We'll 'pancake' 'em out so they'll ride entirely mounted within the thickness of the wing stubs. They're only six-cylinders, of the opposed-piston, two-stroke type, but they'll generate 1,500 horse power at 2,500 r.p.m. at 15,000 feet. We'll have to have enormous strength in the structure of the new ship to dovetail with the enormous power. I have the whole thing pretty well worked out in my head except the interchangeable retractable gear."

"Bill," Sandy pleaded, "won't you please take a look at these sketches? I know I have something here!"

"Booh!" and "Raspberries!" came from Shorty and Red, Shorty adding, "Throw him to the jackals!"

"Let's see 'em, kid," Bill said, sighing.

Sandy jumped from his chair with the sketches in his hand. He flattened them out on Bill's desk and began to explain his theories.

"I should think it would be a little confusing," Bill said at length, trying hard to keep his bronzed face straight. "If both wheels and pontoons are down, how do you know which to land on?"

Sandy looked at Bill and his face was crimson. For a moment his mouth puckered as though he might be going to cry. Then his whole body trembled with anger. "You're all too dumb to know what I'm talking about," he raged. "Listen, Bill! If I make a model and show you how it works, will you let me explain it to you?"

"Sure, I will, kid," Bill said. "I just don't get the idea."

III—ENEMY PLANS

TWO men sat at a small metal table in the sidewalk café of the Hotel Beauvais on lower Fifth Avenue, New York City. Behind them, where Fifth Avenue ran into Washington Square, loomed the white marble arch that was erected to George Washington, a man of truth and honor. But there was no thought of truth or honor in the hearts of the two who sipped their brandy at that small table. Unscrupulous greed was their fetish.

The soft spring breezes and the warming sun were lost on them. They didn't

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notice the couples that strolled by them hand in hand, happy to be alive because of the sheer beauty of the day. They were turning over in their minds an art that was far from beautiful—the art of theft and sudden death, inspired by greed.

Anyone could have told by studying the finely chiseled features and well-formed, blond head of Peter Slade, that he had been born an aristocrat. Groomed to an almost painful neatness, he wore his clothes draped over his lean, hard frame with perfect ease. His chilly blue eyes were contracting and expanding as his long, muscular hands wound and unwound around his glass. By studying him closely you could see what he once had been. You could see youth and courage and clean perfection. But now his face was faded, hard, cruel. He seldom spoke, but when he did the words seemed to crack from his lips like the report of a low-powered repeating rifle.

His companion was a huge bulk of a man, a man who stood six feet two; a man with hamlike hands, long arms and bulging shoulders. It is doubtful if Axel Lucas himself knew what various strains of blood were in his veins. To him such things were of no importance. He believed that a man survived only by the strength in his body and the chicanery in his brain.

One corner of Peter Slade's mouth curled upward as he listened to Axel Lucas. He was thinking that Lucas was a useful bludgeon at times but that he talked too much. It occurred to him that some day he might have to close his mouth forever for his own safety.

"All right," Slade snapped. "Now shut up! People are looking at you and I want to do a little talking."

Lucas opened his lips, then closed them abruptly as he gazed into the two pieces of blue steel staring into his eyes. Something closely akin to fear crept through him. He had told himself once and again that he was not afraid of Peter Slade. But in his heart he knew that he lied. He had seen the cold, ruthless efficiency with which Slade carried out his nefarious trade, and he knew that he had reason to be afraid.

"None of those sketches you got from Barnes is of the slightest use," Slade was saying. "No one but Barnes knows what they mean. I spent hours studying them and they don't make sense to

me. He hasn't started to put his ideas together yet."

"You mean you want me to go back there again?" Lucas asked. "I got everything he had. It cost me two hundred of the thousand you gave me to buy our way in. I don't think we could do it again. Barnes will be ready for us the next time."

"That's all right," Slade said. "I don't want you to go back. I'm going to let him build the plane. That will cost him plenty of money. I found out he is going to enter the San Francisco to Sydney air race. He will fly his new ship. But he won't win."

"Ha! Ha!" Lucas roared. "I suppose you'll have something faster?"

"Stop bellowing like a bull!" Slade said sharply. "I'll fly my own ship. She'll be faster than anything else in the race, except Barnes."

"You goin' to write him a note asking him not to enter?" Lucas asked.

"For the past two years," Slade said, "the Silver Lancer was the fastest ship in the world. It was the only thing in the air that could beat mine. Barnes' new ship will be even faster and sturdier. We can depend on that."

"So what?" Lucas wanted to know. "You goin' to put one of them thermal bombs in the new ship like they did in the Lancer?"

"Stop trying to be funny," Slade snapped. "While I'm winning the race and a hundred thousand iron men you're going to stop Barnes. You're not only going to stop him, you're going to finish him and get his new ship."

"Look," Lucas said, "a lot of better men than me have tried to stop that guy, but he's still around on both legs. No, sir, Mr. Slade! No, sir! If you want Barnes stopped you can stop him yourself. I don't want any part of that baby unless I got a pad of chloroform on his nose. He's poison!"

"All right," Slade said, "I'll grant that he's clever. But other people can be clever, too. I've got the plan that will stop Barnes. And it will stop him forever. You haven't seen me botch any jobs in the past, have you?"

"No," Lucas said, "but you've had enough sense to leave Barnes alone. Sometimes I think that guy ain't human."

"That's just it," Slade said quietly.

"He's built up a great reputation and every fathead, like yourself, has added to it. He's human enough and every human being makes mistakes."

"Yeah," Lucas said, "but maybe you'll be the one who makes the mistake this time, Mr. Slade."

"Stop your damned senseless blabber!" Slade snarled. "I'll outline my idea to you and if you don't have the guts to handle it I'll get someone else."

"An' what happens to me if I don't have the guts?" Lucas asked. A thought flashed through his slow mind that startled him.

"You have the guts," Slade said. "After you have taken care of Barnes and have his ship, the rest will be easy. He'll be out of the way and everyone will think his new ship died with him. We'll knock the ship down and use the hundred thousand I win in the race to start production of fighters just like it. With the armament race that is going on all over the world right now there is no limit to the amount of money we can make. We'll be able to sell 'em as fast as we make 'em because it will be the most formidable fighting plane in the world."

"Yeah," Lucas said, "an' all I got to do is knock Bill Barnes out of the air. It's like sayin' all I got to do is go over to Germany and kick Hitler out an' take his place. Or like goin' up to the zoo to sleep in the lions' cage after I've

thrown 'em out by the tail!" Lucas threw back his large, round head and bellowed with laughter. "Look, Mr. Slade," he said when he had finished. "Suppose I fly your ship in that race. I can fly almost as well an' I got more stamina than you have. Then you can have the little before-breakfast tidbit of crackin' down on Mr. Barnes. Ho! Ho! That don't sound so sweet to you, does it?"

"No," Slade said quietly, "it doesn't sound so sweet to me because it isn't the way I've planned it. Now listen to me and I'll tell you just what you're going to do."

He pulled his chair closer to the table, after one surreptitious glance around him, and lowered his voice to a whisper. Lucas leaned across the table to hear him and as he listened his eyes began to shine with admiration. When Slade had finished he exhaled his breath in one great bellow. He thumped the table once with one of his hamlike hands.

"That," he said, "is something else again, Mr. Slade. That is something that is right down my alley."

"You like it?" Slade asked.

"I like it," Lucas said. "It can't fail. It's what the boys would call a lulu, Mr. Slade."

"You're in?"

"I'm in, Mr. Slade," Lucas answered. "I should have known your idea would be good."

IV—BUILT IN SECRET

BILL BARNES paced back and forth like a caged animal in the secret vault that was his study, underneath the Administration Building. Tacked to a half-dozen drafting boards in the room were the actual first drawings of the big ship he had been dreaming of night and day for over a year.

For the past week he had lived in that single room except when he was asleep. Old Charlie, the head cook on Barnes Field, had sent his meals to him on a tray. Most of the trays had gone back to the kitchen scarcely touched. Occasionally he took a nap, sitting on a high stool with his head resting on his arms and his arms on a drafting table.

His face was lined, his eyes red and swollen, and he was nearly exhausted from the absolute concentration on his job. He had given Tony Lamport instructions not to bother him under any circumstances. He had told young Sandy the same thing. Scotty MacCloskey had kept a guard around him through which no one could pass.

Number 6, which was smaller than the adjoining hangars, had been made ready to put the new ship together. In this small building were housed all the facilities of an up-to-date airplane factory. There was a machine shop where motors could be rebuilt and assembled. A welding plant where the heavy steel tubing was cleverly cut and shaped into the skeletons of Snorters and larger ships. In another part expert workers in aluminum and dural sheet trimmed and bent the light metal plates into the shining skin that covered the Barnes ships.

This building had been the birthplace of all Bill's creations. Here was the spot where the first Snorter took shape; where the big transport-carrier budded and bloomed; where the Scarlet Stormer and the Silver Lancer had throbbed their first bit of life.

The place hummed with activity as the materials that would be needed to build the greatest of Bill's long list of ships arrived.

Old Scotty MacCloskey, with Martin, the chief mechanic, at his heels, was here and there and everywhere. He was like an old hen with her brood of chickens. But he got things done. The place was buzzing with excitement. Everyone was on his toes, consumed with curiosity about the design of the new ship. Bets were being laid as to its armament, its wing design and a hundred other features.

And back in his secret study Bill paced the floor, still trying to evolve the one thing that had him baffled—the interchangeable retractable gear. He had worked out fifty different designs but none of them satisfied him. He was



"Bill," Sandy pleaded, "won't you please take a look at these sketches?"

puzzling over the fifty-first when that knock came on the door. He frowned, cursed mildly, and didn't bother to answer. But the knocking did not stop. It only became more persistent. He threw the pencil he had in his fingers on a drafting table, and crossed the room to yank open the door.

"Listen!" he said on seeing the frightened face of Sandy Sanders. "I gave you orders——"

"But Bill," Sandy said, "you've got to look at this."

"Look at what?" Bill snapped as Sandy edged his way into the room with his hands behind his back.

"This!" Sandy said, bringing a small scale model monoplane into view and kicking the door shut at the same time.

"Take it to hell out of here!" Bill roared. He waved his hands above his head and glowered at Sandy.

"Gosh, Bill, I never saw you act like this before. You act as though you were going nuts. I'm only trying to help you."

"Help me! *Help me!*" Bill shouted. "Here I've been cooped up in this place for a week——"

"Boy!" Sandy said. "You act like one of those artists or writers you read about. If you don't look out you *will* go nuts."

Bill stared at him, and suddenly he was laughing. Some of the worry disappeared from his eyes and the strained tenseness left his lined face. "Okay, kid," he said, "you win. Let's see your model."

Sandy put the model down on Bill's broad-topped desk and his eyes were shining now. He went to work like a super-salesman with a fat commission in sight.

"Let me just explain the general idea first," he said. "Of course, the wheel gear will be retractable. The floats are interchangeable and are attached to the wheel struts in their extended position. Just remove the wheels and all that is necessary are a couple of jury struts to keep the floats——"

"Listen, kid," Bill interrupted, "that's about as clear as it is going over the Allegheny Mountains in the middle of the night with the ceiling zero. *How* does it work?"

"Okay," Sandy said, managing the same kind of knowing smile a salesman might give a grumpy customer. "In the first place the floats will have to be especially built by Edo after my designs. This is just a rough model. I didn't spend much time on it but you'll be able to get the idea." He gulped after he said that because he had spent the better part of a week on it. "The wheels go up into their wells like this and small fairings will close the openings so that the fuselage contours will be as clean as the prow of a speedboat."

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"Yeah," Bill said, "but let's see how the floats are attached."

"This is going to be hard," Sandy admitted. "But you're reasonably bright, so you ought to get the idea. Now, you see, the pontoons will be——"

"Wait a minute, kid," Bill said. "Give me that thing."

Bill took the model and studied the interchangeable retractable arrangement. When he was through he put the model down on his desk and paced the length of his study three or four times.

"You see, Bill——" Sandy began.

"Shut up!" Bill barked. His lips were moving and for a moment he paused and closed his eyes. "Yes!" he shouted. "Certainly! It's a honey, kid." For an instant he stared at Sandy without seeing him. Then he snapped: "Why in hell didn't you tell me about this before? I could have saved three days' time!"

Sandy made a noise in his throat that would be hard to describe. Then abruptly sat down. "He wants to know why I didn't tell him before," he muttered to himself. "Oh, Holy Moses! Can you tie it? Listen, Bill, I've been trying for three months to tell you about it. I've done everything but hit you with a blackjack to make you listen. Do you know that you haven't been out of this room, except to sleep, in a week? And that you wouldn't let anyone in here except old Charlie? Blow me down! And you want to know why I didn't tell you sooner!"

"All right, kid," Bill said. "Scram! I'll have these plans finished soon now."

"Right, Bill. I'll take that model with me to polish it up a bit."

"Polish it up a bit!" Bill roared. "That model doesn't go out of this room for love or money until I have that idea patented for you. Keep your mouth shut about it. You've got something there, kid."

"It's about time you admitted it," Sandy said dryly.

"Maybe it is, kid," Bill said, and he slapped Sandy on the back so hard he could feel his teeth rattle. "When I get out of here I'm going to take you over and buy you the best dinner in New York. We'll go some place where they have a swing band."

"Oh, forget it, Bill, I'm through with that kid stuff. From now on I'm going to devote my time to designing planes.

And say, do you have a name for the new ship yet?"

"No. Any suggestions?"

"Yeah, how about the Warthog?"

"The *what?*" Bill shouted.

"The Warthog," Sandy repeated. "They kinda live both on land and in the water. They——"

"Imagine calling a beautiful thing like she will be the Warthog!" Bill said, pointing to his drawing boards. "Get to hell out of here!" he roared.

Sandy grabbed at the seat of his overalls as he went through the door in record time.

"The Warthog!" Bill said to himself as the door slammed behind him.

Three days later blueprints were made of Bill's intricately drawn designs and incorporated in two bound folders. One of the folders rested in a steel file in the bombproof vault and the other one never left Bill's person. Separate sheets of blueprints were given to the heads of various sections, but they all came back into Bill's hands each night.

Barnes Field became a bedlam of feverish activity. The red-and-black-and-orange Snorters of Shorty, Red, and Bev Bates stood idle in their hangars while they labored in the shops. Young Sandy kept his Eaglet out on the apron, ready at a moment's notice to hop to any designated spot in the country to pick up special equipment or a needed part. Each successive week saw the ship developing from a set of blueprints into something that almost breathed and lived.

Bill and his men forgot all about the mysterious thieves who had plundered his room to steal the first rough sketches of the new ship. But guards constantly patrolled the field, the gates and the concrete path that ran all around the perimeter of the airport, just inside the electrified wire fence. Two trained guards with sub-machine guns were stationed in each of the guard booths, instead of one.

Strangers were kept outside the gates. Only people with definite business to transact could enter. And these were thoroughly searched for weapons with an electric eye before they were admitted.

Excitement and enthusiasm kept at fever heat the one hundred and fifty men who were working on the big ship. Hours meant nothing to even the low-

liest grease monkey. Although at times the place seemed like a madhouse, they were all working together in one dove-tailed unit. They all knew that in the building of the ship they were making another important advancement in the comparatively short history of aviation.

As Bill read in the papers of the planes that were arriving from all over the world to compete in the air race to Sydney, and the time became shorter and shorter, he whipped his men into even greater efforts. When obstacle after obstacle confronted them that seemed at times impossible of solution, they only worked the harder.

When the plane was only one week from completion and Bill found that the cradle holding the various parts of the wing structure in place while they were being assembled was out of line, he almost gave up in despair. It was Shorty Hassfurther who pointed out that the assembly jig was not out of line; that the sag was due to the elasticity of the metal wing, and that there would be no spar sag. Things like that gave Bill the heart to go on in the face of what seemed like insurmountable odds. He knew there would be plenty of minor adjustments necessary after each test flight. But he was ready to take those in his stride also.

Through those hectic weeks he made young Sandy handle all of the regular business and office details at the field. He would not even let Sandy go inside the little airplane factory as the big ship took shape. He knew that if Sandy ever got inside and became a part of the feverish activity there he would get to be as screwy as the rest of his men, go endlessly without food or sleep or recreation, and that the other work on the field would pile up to confront him when the ship was finished.

It was late in the afternoon of a cheerless, rainy day that Bill called Sandy on the telephone from the factory.

"I suppose you want me to go out to San Diego to get a lace cushion for the after cockpit," Sandy greeted him bitterly.

"No, kid," Bill said, laughing. "We'll be going out San Diego way very soon, but we won't be going after a lace cushion."

"You mean she's ready to go, Bill?" Sandy shouted.

"She's ready, kid. Come on over."

But Bill was talking to a dead wire.

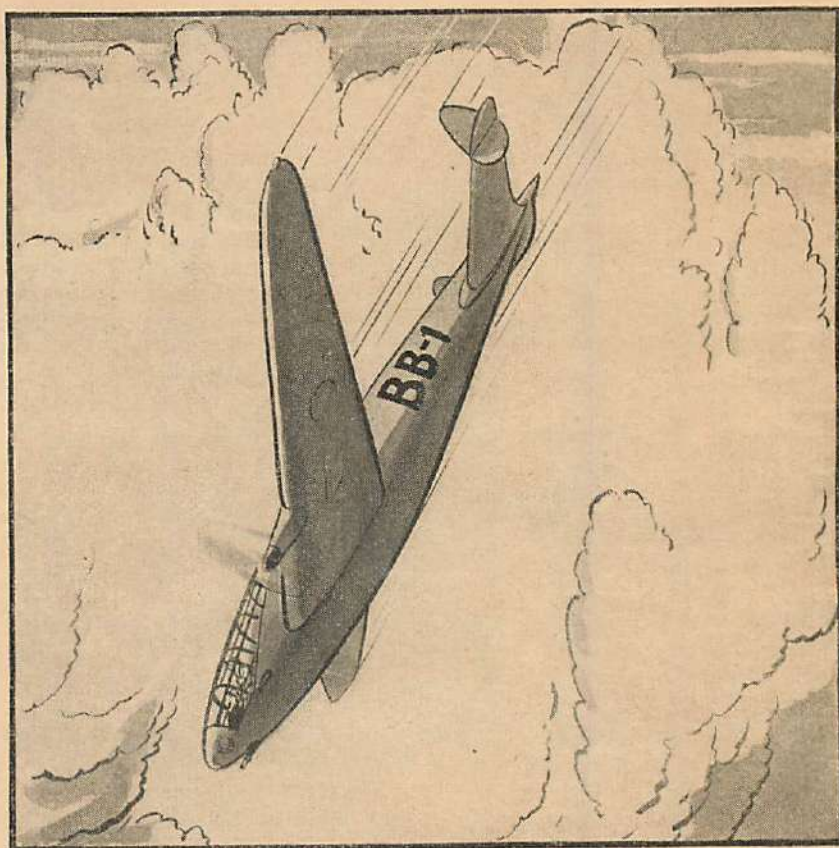
Sandy came through the factory door like a whippet after a mechanical rabbit. Mechanics, grease monkeys, welders, technicians, engineers, sheet metal workers, weather men and pilots were lying on the deck and leaning against stanchions and machinery while they gazed with tired pride at the shining thing that stood in the center of the concrete.

Sandy stopped and gasped in amazement as he broke through the circle of men. Bill and Shorty and Red and Bev Bates stood grinning at him as he got his first glimpse of the shining monster.

"My gosh!" he said in a whisper. "She's so beautiful it hurts to look at her."

"That," Bill went on, "is the way I want you all to feel about this new ship. Whatever she may do in the future, remember you each had a finger in her making and she never would have seen the light of day if it hadn't been for the efforts of each of you."

When the men had all filed out of the building Sandy was still standing there



He put the big fighter through every trick of the combat pilot.

"What do you think of her, kid?" Bill asked.

In his answer Sandy got even with Bill for the agony he had suffered in not being allowed to see the big ship while she was being built. "She looks all right," he said. "Do you suppose you can get her off the ground?"

"Why, you little—" Bill roared and stopped as the metal walls of the little factory rocked with laughter.

"You win, kid," Bill said when he had stopped. He held up a hand and stepped over beside the new ship. He touched its stainless steel side and began to speak. His eyes were strangely moist and there was a catch in his voice as he addressed that motley collection of men.

He only said a few words, thanking them for their tireless efforts and loyalty. At the end he quoted from a poem of Rupert Brooke:

"If I should die, think only this of me:
That there's some corner of a foreign field
That is forever England."

admiring the beauty of the low-wing, cantilever design that was welded into one monolithic unit. The twin "pan-caked" power plants were completely inclosed within the thickness of the shining wings, and the pilot's cockpit in the nose of the fuselage projected well beyond the propeller line. From her gleaming nose to the trimming tabs on her double rudder fins she was a thing of sleekly streamlined beauty and tremendous power.

"She's not much larger than the Lancer, is she, Bill?" Sandy said.

"Not much. But there is more room in the cockpits and she'll be easier to fly. With the outboard Diesels we have much more room in the fuselage. The visibility and radius of fire is much greater from both the forward and after cockpits. Those twin rudders will give you a good clean shot aft. The front cockpit is entirely glazed about the seat line and will give me much more visibility than in any fighter I've ever built."

"That's a swell retractable gear you've got there," Sandy said with a grin.

"It is," Bill acknowledged. "With the landing gear fully retracted she'll do things no other ship in the world will do, and with the pontoons attached she'll still be tops as a seaplane."

"Where's the emergency equipment?" Sandy asked.

Bill touched a side panel just aft of the gunner's cockpit. "In here. The tail section is divided into two watertight compartments that will serve as a tail float. There are auxiliary fuel tanks in each wing that will help float her in case of trouble. She's very much like the Lancer in equipment except for one thing. Come on in and I'll show you. You'll like the change."

Sandy followed him up the folding duralum ladder leading to the after cockpit. The sliding hatch was pushed forward out of sight. He pushed a comfortable parachute chair that was mounted on a sliding base out of the way and crawled forward into a gangway that occupied the center of the fuselage and connected the two cockpits.

"You see," Bill said, "a cantilever beam, triangular in section, forms the backbone of the fuselage structure. The apex of the triangle is down and its stressed skin forms the floor of this passage. The ends of the main fuel tanks slope upward to form the sides. Now watch."

Bill released a clamp and from one side down dropped a hinged, tubular bunk, equipped with a lightweight spring and mattress. "That," Bill said, "will give the pilot not working a place to sleep on long flights and can be used as an ambulance in a pinch."

"That," said Sandy, "is something."

He glanced at Bill out of the corner of his eyes and said casually, "By the way, Bill, who are you going to take with you on the hop to Sydney?"

Bill didn't hear him, or if he did, preferred not to answer. He went on through the gangway and into the forward cockpit. Sandy followed him in and there was admiration and not a little awe on his face as he surveyed the layout. From the front cockpit the pilot, by turning in his bucket seat, could see through the narrow passage back into the gunner's cockpit in the rear.

"She's a sweetheart," he said. "She's even better than I thought she would be. When are you going to start testing her?"

"Tomorrow, kid," Bill said. "And that reminds me. It's late. I'm going to have some dinner and then I'm going to get some sleep. I need it."

"Have you given her a name yet, Bill?" Sandy asked.

"What about the Warthog?" Bill said as he dropped down to the concrete.

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"I realize now that's a pretty lousy name for her. But I'll think of one. Just give me time. Something that denotes speed."

"And power," Bill said. "She's built to stand pressure, kid."

"Yeah," Sandy said, "and she'll probably need it."

Miles away, in New York City, Peter Slade's hard eyes gleamed with satisfaction as Axel Lucas answered him at the other end of the telephone connection. A grimace that was half a smile and half a sneer twisted the corners of his mouth.

"Can you meet me some place in an hour?" he asked Lucas.

"I'm afraid not, Slade," Lucas said. "I have an engagement with—"

"Cancel it!" Slade snapped. "B. B. has finished his ship and is going to begin his tests tomorrow. He'll be taking her out over the tip of Long Island without any ammunition in his guns. Do you get the idea?"

"I get it," Lucas said. "Don't you think we'd be taking a pretty big chance to jump him around here?"

"There's an element of chance in everything," Slade said cryptically. "I want to talk to you."

"How about the Beauvais in an hour?"

"No," Slade said, "you'd better come up here to my apartment. Then there won't be any danger of being overheard. In an hour."

"In an hour," Lucas repeated and hung up the receiver.

V—FLIGHT TEST

SCOTTY MACCLOSKEY and a half-dozen of his assistants swarmed inside the shining monoplane on the apron of Barnes Field at four o'clock the next afternoon. The two single-blade, constant-speed propellers were shimmering discs in the sun against the leading edge of the gleaming wings.

Bill and his men came out of his bungalow and walked slowly toward the apron. Bill, in spite of his usual iron control, was jittery. Preliminary static and taxiing tests were completed. He had been trying for the past several hours to discover what was causing that gnawing worry in the back of his mind. As a result of it he had asked Scotty to

make another check of the new ship. He could think of nothing he had left undone, yet the gnawing persisted.

Just before he went to his bungalow to have Shorty and Red tape his stomach, he had almost called off the flight tests. Then he had silently cursed at himself and decided to go through with them. He had drawn a soft shirt over the tape around his body and a light overall over his boots and breeches. He carried his white helmet and goggles in his hand.

The Eaglet, the little single-motored fighter that had, literally, been built around young Sandy, was standing on the apron not far from the new ship. Her prop was turning over slowly and Sandy's white-helmeted head jutted above the rim of the cockpit.

Bill walked over to the side of the Eaglet and shouted at Sandy, "Keep out of my way if you're going to take that peanut machine into the air."

"Right, Bill," Sandy said. "Good luck!"

Bill waved a hand at him and crossed over to the big monoplane as Scotty MacCloskey climbed out of the forward cockpit.

"She's ready?" he demanded.

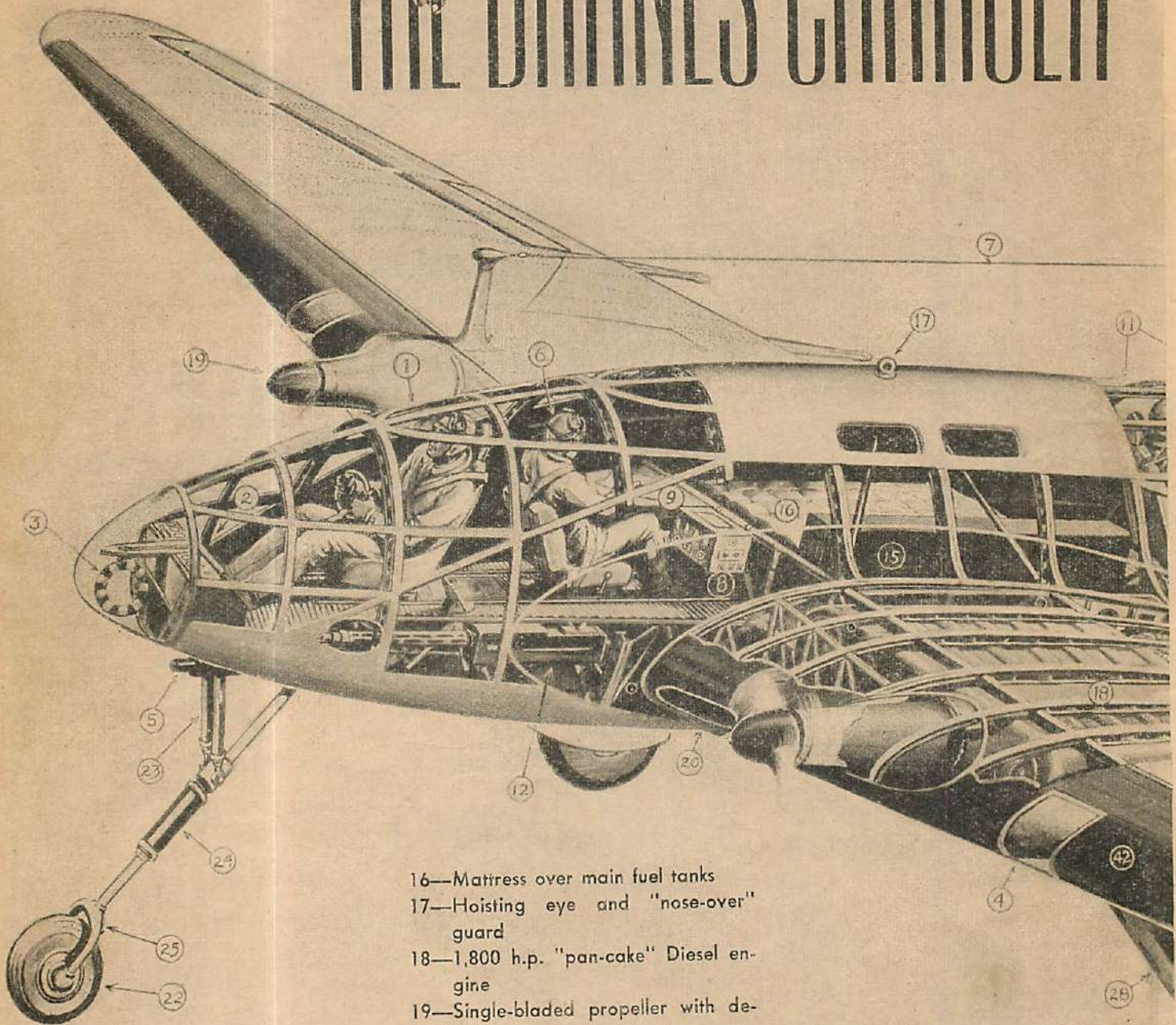
"She's ready, boy," old Scotty said solemnly. "She's the greatest thing we ever built. You better take it a little easy at first. We've checked every bolt and cotter key but something might tear loose."

"I'll eat your overall if it does," Bill said, climbing into the cockpit. He didn't say goodbye to his men because he didn't believe in saying farewell at such a time. But he couldn't deny now, even to himself, that he was worried about something. He couldn't put his finger on the reason, yet he knew as he had known a hundred times before that some inner instinct was warning him to be careful.

He dropped into the parachute chair and fastened the lap strap and shoulder harness of the parachute. His eyes ran over the two main instrument panels which had a slot between them to give him a close view of the ground in landing. Mounted on the vertical backs of the panels were duplicate landing lights that were in the extreme, rounded plexiglass nose of the ship and could be adjusted in flight.

(Turn to page 50)

THE BARNES CHARGER



- 1—Pilot's seat
- 2—Instrument board and Gyro-pilot
- 3—Radio directional loop
- 4—Landing light
- 5—23mm. Madsen auto-cannon
- 6—Navigator-radio-operator's seat
- 7—Radio antenna
- 8—Radio set
- 9—Chart desk
- 10—Gunner's cockpit with sliding seat
- 11—Cockpit enclosure slides forward
- 12—.50-caliber Browning machine gun
- 13—Rear deck enclosure rotates into fuselage
- 14—Ammunition drums
- 15—Small-arms chest

- 16—Mattress over main fuel tanks
- 17—Hoisting eye and "nose-over" guard
- 18—1,800 h.p. "pan-cake" Diesel engine
- 19—Single-bladed propeller with de-icing spinner
- 20—Radiator tunnel in wing
- 21—Supercharger
- 22—Retractable nose wheel
- 23—Oilhydraulic retracting cylinders
- 24—Shock absorber
- 25—Steerable wheel-fork
- 26—Main landing wheel
- 27—Shock absorber
- 28—Diagonal strut
- 29—Rear strut
- 30—Stainless-steel skin
- 32—Cover flap
- 31—Wheel cover
- 33—Wheel well
- 34—Outer wing panel

- 35—Corrugated steel flange of fuel tank spar
- 36—Smooth outer skin of stainless steel
- 37—Main ribs
- 38—Light auxiliary ribs
- 39—Fabric-covered aileron
- 40—Aileron trimming-tab
- 41—Outriggers for Fowler flaps
- 42—Rubber de-icing boot
- 43—Monocoque tail section
- 44—Cantilever stabilizer
- 45—Fabric-covered elevators
- 46—Elevator balance-weights
- 47—Elevator trimming-tabs
- 48—Balanced rudders
- 49—Rudder trimming-tabs
- 50—Navigation light

Successor to the Lancer is this formidable, long-range, bi-motor fighter, engineered in secrecy at Barnes Field.

By FRANK TINSLEY



The October cover, scene of the story "The Charger Goes to Sydney."



When Bill Barnes phoned to say that he had finally taken the wraps off his new fighter, you can bet I burned up the roads between my studio and Barnes Field. I knew that he had been working on a new ship for over a year, and ever since the loss of his beloved Lancer I had been waiting to get a look at its successor. Unfortunately Bill was called away shortly after he phoned and I was met by Sandy and the gang. I don't know whether the boys were jealous of Bill's new bus or were just trying to act hard-boiled. In any event, after a lot of horsing around, Sandy was elected as guide and lecturer. Maybe you think he hated it! After a hasty Bronx cheer for Shorty, he grabbed me by the arm and hustled me off to the apron.

The new ship had been wheeled out of the hangar and stood gleaming in the sun. A number of interesting points struck me as we approached her. The usual hump of the windshield was missing and the line from nose to tail was as clean as a hound's tooth. A close-up view of the big girl plus a quick reference to the plans carried by Sandy proved enlightening. The Barnes Charger is a low-wing, cantilever monoplane embodying many advanced ideas in design and construction. Much of the structure and all of the covering is stainless steel, welded into a single monolithic unit. The tricycle landing gear is fitted so ingeniously into the wings and fuselage that its almost perfect streamlines are unimpaired. The twin power-plants are completely enclosed within the thickness of the wings, as are auxiliary fuel tanks for long-range flights.

The Charger is designed primarily as a high-performance two-seater fighter. Although but slightly larger than the Lancer, the new flagship of the Barnes fleet is a vastly more roomy and comfortable ship to fly. The outboard placement of the engines permitted full scope to Bill's ingenuity in designing the interior of the fuselage. Alert to his opportunity, the young engineer has worked out an arrangement permitting a degree of visibility and a radius of fire unequalled in any fighting plane of today. Let's climb aboard the Charger and see for ourselves.

The slim, gleaming fuselage is parallel to the ground, and it was an easy matter to follow Sandy up the folding duralum ladder leading to the after cockpit. The sliding hatch has been pushed forward out of sight and we lean gingerly over the coaming for a look. Most of the space is occupied by a complicated seat intended for the gunner. This consists of a comfortable parachute chair which swivels around to face either forward or aft. A quick release catch locks it in either position. The chair is mounted on a sliding base which, when released, rolls back and forth like an oarsman's seat in a racing shell. The only difference is that the tracks upon which this chair moves are inclined downward and then up again, describing a flattened arc.

Sandy grinned at my mystified glances. "How do you like the roller coaster?" he asked in an elaborately casual tone. Despite his bored air, the kid pilot of the Barnes gang was itching to show off the new ship. "Want to see how it works?" Without waiting for an answer, the eager young veteran dropped into the seat and snapped on the safety belt. "By the way," he paused to ask, "did you notice the belt? It's one of the new type developed by the Army to keep a guy from picking teeth out of his back hair every time he noses over." Sandy waved a blasé thumb toward the

heavy web straps that passed over his shoulders and snapped into rings on the chair back. "Pilot seat's got one too." He leaned forward and worked a control.

The low, transparent whale-back extending aft of the gun track turned smoothly on its longitudinal axis and disappeared into the fuselage. The kid unlocked the gun mounting nested under it. When he pulled it into position with easy familiarity, the heavy .50 Browning swung around with very little effort. It is so perfectly balanced that it appears to be no more awkward to handle than a .30. "It's not so bad," Sandy replied to my question. "You're not supposed to throw this baby around much anyway. At the speed the Charger hits, it's just a waste of good ammunition to fire broadside. Those twin rudders give the gunner a good clean shot aft and we just use this to keep our tail clear."

He reached down and disengaged the sliding seat. "Now I'll show you how the roller coaster works. Suppose a guy comes down on your tail and then zooms up over you." Sandy took a firm grip on the handles of the Browning and centered his sights on an imaginary adversary. As the invisible enemy started his climb, the seat moved forward and down. With a smooth motion the gun swung upward as Sandy slid almost out of sight under the rear deck. When the Browning's barrel was vertical, the kid was lying almost flat on his back in the comfortably tilted chair. Throughout the movement, his eye had never once left the sight ring. He grinned up at me for a moment and then straightened his legs with a shove that pushed the seat back into an upright position. "Neat, hey?"

I admitted that the arrangement was indeed neat and went on to examine the rest of the equipment in the cockpit. Below the gun track is a handy rack for extra drums of ammunition. Swinging his seat around to face forward, Sandy pointed out the duplicate instrument installation. The multitude of dials and gadgets is separated into two groups, each mounted on a separate panel attached to the rear wing spar. The narrow opening between them gives access to a gangway that connects the cockpits. The flight instruments are installed in the left panel and I noticed that they are arranged in the same grouping as on the defunct Lancer. The right-hand panel is fitted with a duplicate radio set, intercockpit telephone and electrical controls. Long, narrow panels, set in the floor on either side of the gunner's seat, contain the engine instruments. The duplicate control column folds out of the way when not in use and is similar to the one used in the Lancer. Beneath the main instrument panels are auxiliary rudder pedals which fold forward against the spar web.

Following Sandy's lead, I climbed into the cockpit and crawled on hands and knees over the main fuel tanks that occupy the center of the fuselage. A hinged, tubular bunk, equipped with a lightweight spring and mattress, may be dropped down on top of the tank to clamp upon the spars. This provides a comfortable resting place on long flights and also permits the Charger to be used as an ambulance plane. A first-aid kit and arms rack occupies the other wall. I noticed that the latter contained the usual Barnes emergency armament consisting of a Thompson sub-machine gun, a Springfield rifle equipped with a telescopic sight, two colt .45 automatics in holsters, and a Very signal pistol. Ammunition belts and pouches are provided. (Turn to page 88)

Beneath the bank of engine instruments on either side of his seat were mounted a pair of fixed .50-caliber Browning machine guns. They were easily accessible to his reach in case of jamming. They were both fitted with large ammunition reels and could be loaded from the cockpit or from outside. The ammunition counters were clearly visible to his gaze at all times.

By lifting a trap door immediately behind his seat, Bill could get at the breech mechanism of the sleek, long-barrelled automatic cannon that nestled snugly within the triangular section of the main beam of the ship. All his guns were aimed through a single telescopic sight mounted above the radio panel. Beside it was a retractable infra-red ray telescope that permitted him to see through fog, rain or the darkness of night.

The two metal props whirled into shimmering arcs as the twin-pancaked Barnes-Diesels in the wing stubs belled forth the full-throated roar of their three thousand horses. The gleaming monster seemed to tremble in eager anticipation as Bill released his wheel brakes and flipped a hand above his head in a farewell gesture.

His eyes scanned the air above him as he blasted the big ship around into the wind and fed it juice. The twin engines welled together in a deeper, mightier roar as it sped down the concrete runway. Bill crouched forward over the control column as the tail of the silver bullet lifted. He whipped the nose up a moment later and the machine left the concrete; after a bit the wheels were retracted into their wells, where small fairings closed the openings.

Something of the peace and serenity that is the natural heritage of the airman crept into Bill's blood. His nervousness vanished as he hung the big ship on her props and took her upstairs. He flipped the key on his radio panel and spoke Tony Lamport's call letters into the microphone.

"I'm going to take her upstairs," he said after Tony had come in. "She's everything she's supposed to be, Tony."

"Take it easy, Bill," Tony said. "You're going to put her through her stuff above the field?"

"Right," Bill said. "Signing off."

"Why in hell does everyone have to tell me to take it easy?" he said viciously. For a moment that gnawing worry came back to him. Then it was gone as he watched his rate-of-climb indicator and saw the speed at which the ship was taking him aloft.

At twenty thousand feet he switched on the oxygen supply that fed directly into the sealed cabin. He flicked his eyes across the instrument panel with its numerous temperature gauges and rolled the big fighter over on its back. An instant later he lined up the hangar

below him in his machine-gun sight and dropped the nose as he opened the throttle wide.

"We'll find out what she'll take first," he said between clenched teeth. His heart came up in his mouth as he braced himself and made sure he could get his hatch open fast in case she went to pieces.

His ears began to throb and pound as the big ship plummeted toward the earth at terrific speed. His glance flashed across the airspeed indicator, altimeter and tachometer as he sped down and down. The terrific howl of the gale that raced by the streamlined fuselage and the awful rataplan of the props welled into his tortured ears and deafened him.

Down and down he plunged until it seemed that nothing could stand such fearful pressure. The prop blades were traveling faster than the speed of sound now, to leave a vacuum behind them. As the two continuous walls of air slammed against each other behind the plunging ship, the din was like the thunder of the gods. Every few seconds Bill slithered his eyes off to the right to see the earth that was climbing toward him at terrifying speed. At nine thousand feet he eased back on the wheel.

For one frightful instant he thought he was going to black out as he pulled the nose up before he leveled off. His insides felt as though they had been ripped out of him. He was, for the moment, as weak as a new-born kitten. Cold, clammy perspiration dripped off his face as he set the automatic pilot to work and collapsed in his bucket seat.

"She's got it! She's got it!" he said rapturously a few moments later. "She'll do things the Lancer never would do. She's as skittish to the touch as a thoroughbred."

He took back the controls and climbed to twelve thousand feet again and began to put the big fighter through every trick in the repertoire of the combat pilot. He came up and down in outside loops, to chandelle up and around with a speed that was dazzling. He came up in normal loops and half-rolled the ship level at the top with a speed that was terrifying. He barrel-rolled, sideslipped, skidded, did wingovers and split S's until he had his men on the ground softly cursing.

He went through a series of flat and inverted spins and then into a tail spin that brought the hair up on their heads. At the last minute, when it seemed he could never pull out, when it seemed he was in an uncontrolled spin, he threw his controls, gave his engines all they would take to warp and yanked out of it.

He followed that with a low-speed loop, a climbing loop, a rocket loop and a zooming flick loop and ended with "the spectacles," in which he did a vertical figure 8 that only a ship powered like this one could accomplish. Then he

fluttered toward the ground in a falling leaf that brought a sigh of relief to the men watching him. He reached for his radio switch and spoke to Tony Lamport again.

"How did she look, fellah?" he asked.

"Swell, Bill!" Tony gasped. "But listen, she's had enough for one day. So have we. You better bring her in."

"I'm going to run her out over the Atlantic for a few miles," Bill said. "I want to find out what she has to offer in the way of speed."

VI—CHARGER INTO BATTLE

BILL settled back in his bucket seat, nosed the gleaming ship up to fifteen thousand feet and fed it gasoline. His tachometer registered 2550 r.p.m. when he had his throttles fully open.

His eyes were narrowed to mere slits as he probed the air ahead of him, then shifted his gaze back to his instrument panel. He saw the airspeed indicator pass four hundred, four-fifty. He closed his throttles for a moment at that speed because it looked as though the twin engines were going to "over-rev."

The big ship was like a ray of light shooting out of the east at daybreak. With its twin engines roaring and the two props whining, it cut through the air at a speed that was almost beyond comprehension. It didn't seem possible that any mechanism or any human being could stand the strain of such terrific speed.

Once again Bill opened his throttles wide. He was bent over the control column with his eyes glued to his instrument panel as the airspeed indicator climbed. His face was strained and tense from fighting the controls. He eased his throttles closed a couple of notches and cut his speed to four hundred.

"She's too quick on the controls," Bill muttered to himself as he brought her around in a right bank and for an instant felt his senses swimming away from him.

He leveled off and then jammed the wheel forward until he was diving vertically toward the Atlantic. He held the wheel forward and brought the nose under and up until the big ship was flying level in an inverted position. He rolled her upright with a speed that drew a black line across his eyes, and took her aloft at the rate of seven thousand feet to the minute. That, he thought, was performance.

Satisfied, he brought the ship around in a vertical bank and laid the nose on Barnes Field. A warm glow suffused his whole body. She had plenty of "bugs" that would have to be ironed out during the next two weeks while he continued to give her tests, but he knew that she

could take it. She was, indeed, the greatest of his great line of fighters.

Suddenly, Bill stuck his hand up to block out the sun and probed the air around it. He looked back and up on both sides of him, but he could see nothing. He bent his head and cocked it on one side, then the other. He wondered if the thundering roar of the twin Diesels had affected his hearing. He was almost certain that he could hear other airplane motors some place around him. He scanned the air above and below both wings. He could see nothing, yet the sound seemed to be growing louder and closer.

He had just decided he was imagining things when those two olive-green monoplanes came diving out of a wisp of fleecy clouds only a thousand feet above him, their engines roaring. Bill's body tensed as he flicked his glance upward and saw white streams of tracers floating past him on each side. His mouth grim, he reached for the switch that would make the two .50-caliber Brownings ready for action. Then it came to him, like a blow in the face, that he had specifically given Scotty orders not to load any of the guns in the new ship.

He cursed softly to himself and reached for the throttles to open the gleaming ship up and run away from them. But a moment afterward he realized he was too late. The two ships had come out of their dives and had chandelied up and back to take positions a little behind and above him on each side. As the new ship's airspeed indicator began to climb, they laid a cross-fire in front of its nose. A cross-fire that Bill would have to run through unless he cut his speed.

The cold hand of fear and panic fastened around his heart as it came to him what they were going to do. They were going to ride herd on him and force him to land where they wanted him to land, and then steal the new ship. Suddenly, he dropped the nose to dive away from them, but their bullets were slashing across his bow before he could get that first necessary burst of speed to escape from them. He nosed up and leveled off again while he sought desperately for a solution.

The solution came as the light on his radio panel gleamed scarlet and he threw the key. It was young Sandy's voice that beat in his ears: "Hold it, Bill! I'm seven thousand feet above you. I'm coming down to get 'em! Hold your course!"

Bill shouted into his microphone to give the kid instructions, but he might as well have saved his breath. Only the terrific rataplan of Sandy's diving motor came to Bill's ears as Sandy stuck the nose of the Eaglet down with his radio switch still open.

As Bill glanced up over his shoulder he knew that the kid was standing up-

THE CHARGER GOES TO SYDNEY

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

right on his rudder bar as he aimed the nose of the Eaglet at the olive-green monoplane on Bill's right. Down and down the little ship plunged for five thousand sickening feet before Sandy eased the nose up, only to drop it again in a forty-five degree dive that would make his guns accurate.

Bill saw the white, startled face of the pilot of the olive-green ship on his starboard side rise suddenly as Sandy's bullets began to chew through the trailing edge of his port wing.

Then Tony Lamport's voice was begging in Bill's ear for acknowledgment, and he had to take his eyes off the silver streak that was the Eaglet.

"Go ahead. . . . Go ahead!" Bill chanted back. "Bill speaking, Tony. Go ahead!"

"I picked up Sandy's message!" Tony said excitedly. "Red and Shorty are warning up their Snorters. They'll have 'em off the field in a couple of minutes. Give me your position."

"They don't need my position," Bill snapped. "Tell 'em to take a course southeast over Long Beach. They'll see us. Tell 'em to get in the air fast."

"They're getting away now," Tony said. "Are you okay, Bill?"

"I'm okay," Bill said. "I'm going upstairs to get out of Sandy's way. There is nothing I can do down here."

Bill hung the big ship on its props and took it five thousand feet above the three snarling fighters. His face was white and set as he watched the skillful pilots of those two olive-green monoplanes try to annihilate Sandy in one terrific burst of fighting. He saw Sandy come out of his dive and nose up as the two ships pounced on him with their guns yammering flame and death. He saw Sandy bring his little Eaglet up in a loop and roll it level at the top in a flashing Immelmann the monoplanes could not follow fast enough to use their guns.

What Sandy lacked in power he made up for in the dazzling speed of his maneuvers. He darted about the two more powerful ships like a swift attacking two crows who have robbed its nest. Flaming death belched from the guns of the Eaglet as the kid clamped down on his trips. White tracer smoke curled off the port wing of one of the olive-green monoplanes, but Sandy's speed was too great for accurate shooting.

The youngster was trying only to hold

the two monoplanes off Bill's new ship until Shorty and Red could arrive. He had heard part of Tony's message to Bill and he knew that help was on the way. Now and again he tripped his guns as the two enemy pilots tried to annihilate him. He was gasping and blood was pounding in his head when Shorty's voice came to his ears.

"Stay with 'em a couple of minutes longer, kid!" Shorty said. "We . . ."

Then static obliterated Shorty's voice as Sandy went through a series of Immelmann turns that took him away from danger momentarily.

The next instant, when he thought he had one of the ships lined up under his sights, it suddenly dropped its nose in an almost vertical power dive and started toward a low-hanging bank of clouds that was only a thousand yards away and below them. As Sandy saw the other one follow the first he probed the air above him and saw the two diving bullets that were Snorters coming out of the sun three thousand feet overhead. He heard the terrific roar of their props and engines as they sped down on the tails of the two olive-green monoplanes trying to escape.

He leveled the Eaglet off and heard Bill's voice screaming into his earphones.

"Shorty! Red!" Bill shouted. "Pull 'em out! Let 'em go! Get up here beside me and convoy me home. Do you hear me? Pull 'em out!"

Fifteen minutes later the four ships rolled in to a landing on Barnes Field. Red Gleason, Bev Bates, Scotty MacCloskey and half the force on the field were on the apron to meet them.

Bill's face was white and drawn when he climbed out of the shining monster that had very nearly gone to its death on its first test. He didn't answer any of the questions that were thrown at him as he stepped down. Instead he walked over to the Eaglet as it rolled up on the apron behind him. He waited for Sandy to lock his brakes and turn off his ignition. His eyes were gleaming as he reached over the cowl and grasped Sandy's hand.

"Thanks, kid," he said. "How the hell did you get out there?"

"Oh, the Eaglet will get places," Sandy said. "It just occurred to me that you might run into some trouble so I decided to hang around. Who were those lugs, anyway?"

"I don't know. That doesn't make

any difference. The only thing that matters is that you were there with the stuff it took when the time came."

"You've done the same for me a lot of times, Bill," Sandy said. "But," his face suddenly lit up with a beatific expression, "if you want to thank me you can let me suggest another name for the new crate, Bill. I thought of a lulu while I was watching you out there."

"All right," Bill said with a grin, "we'll talk it over later. I—"

"No! Wait a minute, Bill! Listen, with those black rubber boots on the leading edges of the wings for de-icing and the props stuck in there like two eyes and the air-cooling radiator just below that looks like nostrils, she looks like an old-time war horse clad in silver armor ready to charge into battle. Do you get what I mean, Bill? She's fast and she's powerful. She looks just like one of those old war horses ready to go, snorting fire and flame—"

"But what's the name, kid?" Bill asked.

"The Charger, Bill!" Sandy said. "That's what she looks like and she has all the power of a charger, a war horse."

A faint smile flitted across Bill's face as he listened to Sandy's excited voice. For an instant he stood silent.

"The Charger it is, kid," he said finally. "And it's a name that fits every bit of her. Power and speed and guts."

They shook hands again to make it stick.

VII—"BE READY"

FOR the next two weeks while the crack distance and racing pilots of the world assembled their ships in San Francisco, preparing for the race to Sydney, Australia, Bill and Scotty MacCloskey drove their men to new heights of feverish activity in ironing the hundred and one "bugs" out of the Charger.

And while they worked, testing and retesting, eradicating flutter and vibration and a multitude of other maddening things that had to be overcome, Bill's men argued with him to place them at strategic points along the course of the race.

"Listen, boy," old Scotty said, "Howland and Baker Islands, north of the Phoenix group, both have permanent colonists on them now. So have Canton and Enderbury in the Phoenix group. The Navy put them there. That is one of the reasons the government sanctioned this race. Those islands will all be seaplane bases for the Pacific fleet within a few years."

"That has nothing to do with the present," Bill snapped.

"If you place one of us at Honolulu, another one, say at Baker, and a third at Noumea on New Caledonia, you

won't have to take such a horrible risk," Scotty pleaded. "If anything goes wrong we'll be close enough to pick up a radio call and get there fast. If we're in San Francisco we won't be able to help you."

"No," Bill said again, "I won't need any help."

"Some of the other ships are going to refuel at Honolulu and Noumea," Shorty said.

"That's their business," Bill said. "It's only a seven-thousand-mile hop. If the Charger can't do it now she'll never be able to do it. That's what I want to find out. I can do it in a little over sixteen hours. Why, as far back as 1932 those two Frenchmen flew a closed circuit, without refueling, from Floyd Bennett to Rayack, Syria. It was a sixty-five-hundred-mile hop. They didn't have a lot of men stationed along their route. If the Charger can't beat that record I'll retire her and put her out in a pasture to graze. This is an air race, not an old man's walking marathon!"

"Only seven thousand miles," Red Gleason groaned. "It isn't a question of refueling or whether the Charger can do it, Bill. It's a question of your safety. If you're forced down two thousand miles from nowhere you won't have a chance."

"Okay," Bill said, "I won't have a chance. That's all right with me. I'm not crying. If I don't finish it's my tough luck. I will have at least put all

I had into the try. Let's let it go at that."

"But, Bill," Sandy said, "what about Shorty? Don't you think you ought to think about him?"

"Shorty!" Bill roared. "What the hell does he have to do with it?"

"He'll be riding the after cockpit, won't he?" Sandy said.

"No!" Bill snapped. "If you're going to be worried about that, worry about yourself. You're going to be riding in the after cockpit!"

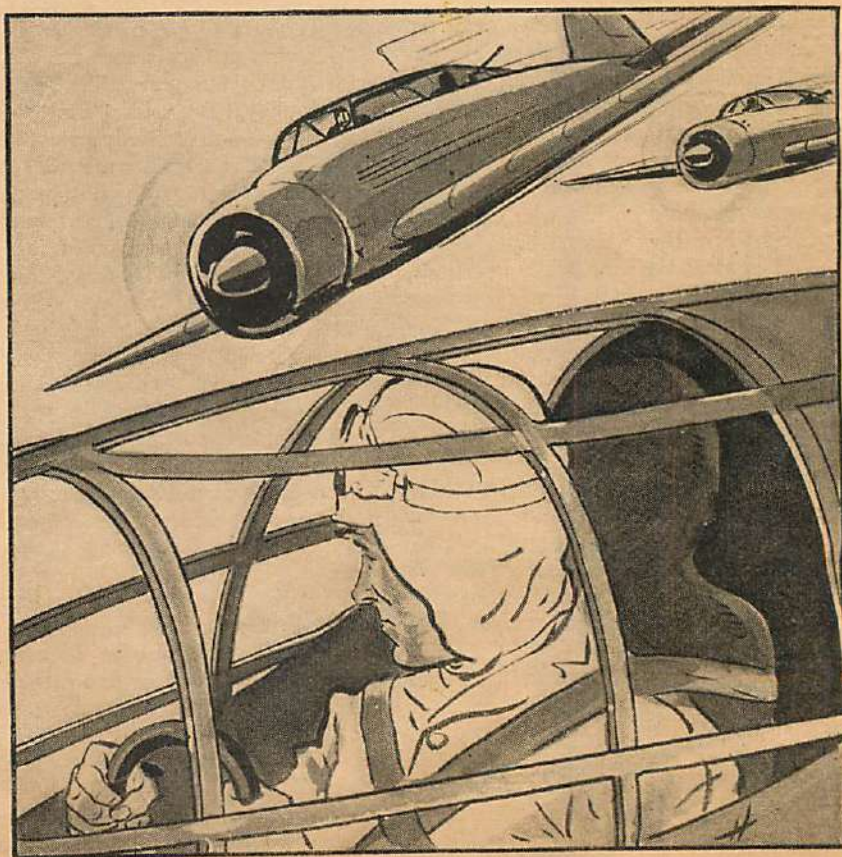
The freckles on Sandy's tanned face stood out even more prominently as color surged into it. He tried to open his mouth to speak, but no sound came from his lips.

Shorty Hassfurth and Bill, then all the others began to laugh at him. His surprise was so complete that it was ludicrous.

"Blow me down!" he finally managed to say. "Why—why didn't you tell me before? I—I thought of course you'd be taking Shorty."

"We talked it over a week ago and decided the fish in the Pacific would like you better than they'd like me," Shorty said. "You'd better buy a few boxes of goldfish food to throw to the sharks in case you're forced down. Maybe they'll leave you alone until some one picks you up."

"Holy mackerel!" Sandy gasped. "You're sure you don't mind, Shorty?"



Then those two monoplanes came diving out of a wisp of cloud—

"Mind?" Shorty answered. "I told you, the fish don't like me. My father threw me to the sharks one time when I was only three years old. The next morning they found me on the front porch, safe and sound. A couple of sharks had brought me home during the night. I was too tough for 'em. They broke their jaws snapping at me."

"Oh, nuts!" Sandy said. "I'll be Johnny-on-the-button all the time, Bill."

Three days before the start of the race Scotty MacCloskey and Bev Bates took off for San Francisco to make preparations for the fueling and checking of the Charger.

Bill lifted the big shining bullet off Barnes Field the next day with Sandy in the after cockpit. Shorty Hassfurter and Red Gleason spiraled upward to take a position on each side of the Charger after they had all gone through the ordeal of being photographed by a swarm of newspaper photographers and movie men.

"We'll win if we can," Bill had said into a microphone as the movie men ground away while he stood beside the glistening ship. "We'll fly nonstop, taking turns at the controls."

"Will you please say something, Mr. Sanders?" the movie man had said as he moved the mike in front of Sandy.

"Blow me down!" Sandy said. "I don't have anything to say!"

Those were the words that were released to the public in a thousand theaters the next day. "Blow me down!" became a catch phrase that caught the public's ear.

The prayers and good wishes of the whole country were with Bill and "Blow-me-down" Sanders. The public waited impatiently for the starter's flag to drop on the first ship the next day.

Staccato-voiced radio announcers and the newspapers kept the public's interest at fever heat. The yellow journals hinted that actually the race was a subtle warning to Japan to tread easy. They compared it with the naval maneuvers of the British Navy at Singapore. A warning to the Far East that we were ready in case of trouble. Leather-lunged newsboys and breathless news announcers had the whole country sitting on chair-edge.

The radio news men gave the public short but interesting sketches of the famous international pilots who were entered. They were unanimous in their choice of the crack French team of Cochet and Montaine to win, with Peter Slade, the mysterious Englishman, a close second, and Bill Barnes third. A German pilot named Bross and a Soviet were also included in the list of probable place-takers. They went to some trouble to explain that Bill Barnes would be considered a sure winner if his plane the Silver Lancer had not been destroyed. They said little was known of

the performance of Barnes' new ship, and this was why he was not an outstanding favorite to win.

The Charger, with a Snorter on each side of it, purred across the continent in a little under nine hours. When Bill whisked it in for a fast landing on the Alameda airport, Scotty MacCloskey and his men were waiting to rush it into the hangar to which they had been assigned before the experts and newshawks could make an inspection of it.

"Sorry, boys," Bill told them as the hangar doors closed behind the shining monster. "You'll know all about her after the race. Until then she's hush-hush."

"How did she do, boy?" old Scotty asked him when they were inside.

"She's ready," Bill said. "She was as sweet as a summer breeze. Just check her and fill her up. Don't let anyone near her. And that goes for *everyone*." He turned and shouted at Sandy, "Hey, kid, come on. You're going to bed until six tomorrow morning."

Peter Slade, that meticulous and mysterious gentleman who was known to everyone but known personally to no one in the aviation industry, had watched Bill Barnes bring the Charger to a halt on Alameda airport.

His hard, cold eyes had darted over the Charger from stem to stern from his vantage point in front of the hangar that housed the red speed ship he called the Rapier. When the Charger was locked in her hangar he went over to the administration building and sent a radiogram to a point in the South Sea islands. It read:

BE READY.

VIII—SYDNEY BOUND

IT seemed to Bill and Sandy that all the world was on its way to Alameda when they took a taxi from the St. Francis Hotel to the airport the next morning at six-thirty.

A newsboy stuck a morning paper through the open window of their cab crying, "All about the big race. Swedish entry killed in test flight!"

On the front page of the newspaper was a picture of Bill and Sandy standing beside the Charger.

"There's your handsome pan on the front page," Bill laughed.

"Gosh, Bill," Sandy said, "I'm as nervous as a cat on a red-hot stove. You

don't suppose anything could have happened to the ship last night?"

"Quiet down and keep your pants on, kid. Nothing happened to the ship with Red and Shorty and Bev and Scotty riding herd on it. There's nothing to worry about." Suddenly he turned and looked into Sandy's face. "Say, you're not worried about the flight itself, are you? I mean, that we'll be forced down?"

"No, Bill," Sandy said seriously, "that part doesn't worry me even a little bit. If anything happens it happens. It's just nervous tension. It's the way I used to feel last fall when I was playing football out on Long Island. Just before every game I'd get nervous as the deuce. When the kick-off came the bottom of my stomach seemed to drop out. If the kick came to me my legs used to get so weak I could hardly hold myself up until I had the ball in my arms."

"You seemed to do all right after that," Bill said dryly. "You made three touchdowns in the last game Barford played."

"Yeah," Sandy said. "But I had a good line in front of me. Barford had the best line in the country."

"It will be the same way in this race, kid," Bill said. "You'll have the best ship in the country under you. You're going back to Barford again this fall, aren't you?"

"I sure am," Sandy said, his eyes gleaming. "We're going to have the best team in the country this year, Bill."

"I want you to go on through and get your engineering degree, kid. Don't place too much importance on football."

Bill was talking to keep Sandy's mind off the race; to prevent his becoming too nervous before the start. He knew that as soon as they were in the air the kid would settle down like an old veteran and take things in his stride.

The taxi whisked them through the gates and down a road toward the hangars. Planes were being jackassed out onto the apron from the long row of hangars. Mounted and foot police held the great throngs of people back from the long concrete runways. The roar of engines blasted the place into an inferno of noise and confusion. An announcer's voice blared through a loudspeaker. Excitement was everywhere.

"Ladies and gentlemen," the announcer shouted. "In just twenty min-

THE CHARGER GOES TO SYDNEY

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

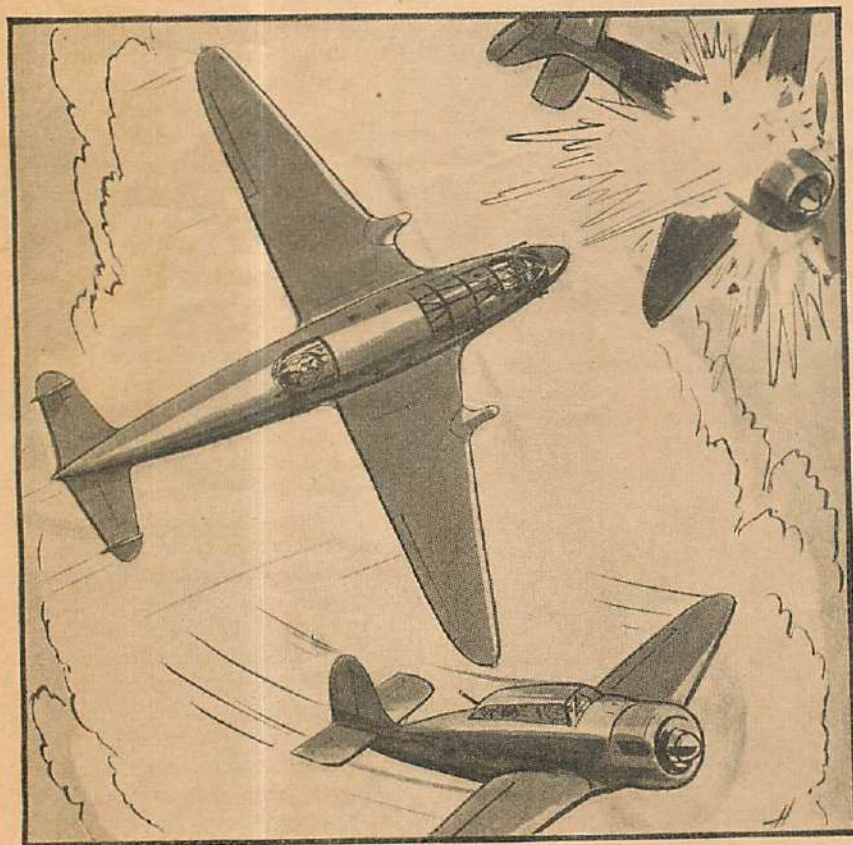
utes the German entry piloted by Bruno Bross will take the air. The ship is that high-winged monoplane with twin engines standing at the head of the north-south runway. It is finished in black and has a large one painted on the side. The one indicates that Bross drew the number one position in the draw which establishes the take-off positions. There is no handicapping. The route is the shortest and fastest one from San Francisco to Sydney. Any route may be taken. The various pilots have made their own arrangements for refueling at Honolulu and other points through the South Pacific. Some of the entries will make the flight non-stop, without refueling.

"This race, ladies and gentlemen, is the most ambitious endeavor ever undertaken by the aviation industry. It was promoted for the benefit of scien-

Bennington Aeronautical Foundation. To the winner will go one hundred thousand dollars as first prize money. To second place, fifty thousand, and so on down the scale. There are sixty entries altogether. Of the sixty all but two will start.

"The French team of Cochet and Montaine are favored to win in the betting. But a lot of American money is being laid on that intrepid young flyer known to all of you—Bill Barnes. Barnes is flying a new ship which he built and designed himself. With him will be the youngest of his famous little squadron—Blow-me-down Sanders!"

Bill and Sandy stepped out of their taxi and made their way through the crowd unnoticed. Scotty MacCloskey was directing the opening of the hangar doors and the tuning up of the Charger as they stepped inside.



Bill's fingers clamped down on the trigger of his 37mm. cannon.

tific research. Each plane and each pilot had to pass certain requirements before they could be entered. It is not the foolhardy affair some newspapers and politicians have tried to make it. A string of fast destroyers from the Pacific Fleet of the United States Navy is patrolling the course from here to Sydney. Each plane must carry a two-way radio set. In case of trouble a destroyer will speed to the rescue.

"A total of a quarter of a million dollars has been offered in prizes by the

The twin pancaked motors contained in the deep wings of the Charger were thundering as Shorty Hassfurth revved them up in the forward cockpit. He killed them at a signal from Scotty and climbed down to the concrete. His hard-bitten blue eyes were smiling.

"If you can't win with her," he said to Bill, "you couldn't win in a rocket. She's a honey. I wish I hadn't ruled myself out of the after cockpit in favor of that Barford halfback, or halfwit, beside you."

Sandy's answer was drowned out by the roar of the twin motors in the German Dornier Special at the head of the runway. The announcer's voice, amplified to be heard above the roar, floated into the hangar:

"The German Dornier Special with Bruno Bross at the controls and his mechanic are now climbing into their cabin. They were fortunate enough to draw the number one position. There comes the official starter out with his black-and-white checkered flag. His arm is up. When it drops it will be precisely eight o'clock and the race will be under way!"

"There it goes, folks! His arm is coming down! And they are A-WA-YYYY!"

The roar of the Dornier's engines drowned out the cheers of the crowd as the pilot released his brakes and poured in juice. A moment later it flashed down the long runway, faster and faster. The tail came up. The skillful Bross bounced the heavily laden ship once, twice and then pulled the nose up into the air in a long, low climb.

"All right," Bill said, "let's go! Get her out there, Scotty. We're in seventeenth position. We'll be getting away in fifteen minutes."

The number two ship, piloted by the famous team of Cochet and Montaine, was wheeled into position. The props of the big Breguet Special were brilliant discs in the bright sunlight. The starter's flag fell again and the monoplane raced down the concrete and thundered into the air on the tail of the Dornier Special.

With a flash and a roar, ship after ship sped down the runway and was away while the crowd stood there in open-mouth wonder. Never before had such a great array of internationally famous racing planes been assembled. Each new design brought a gasp from the crowd as it was wheeled out and flashed away.

The cheering rose to a mighty roar as the Charger was jackassd up into position and Bill and Sandy climbed into the cockpits clothed in their regular white overalls and white helmets.

"There she is, folks!" the announcer bellowed. "According to Bill Barnes the greatest ship that ever came out of his workshop. Look at the 37mm. cannon peeping out of the nose in front of Barnes. And the two .50-caliber machine gun troughs along each side of the nose. You know Barnes has special permission to arm his ships because of the valuable work he has done for the government. His famous Snorters and young Blow-me-down Sanders' Eaglet are all armed with machine guns for the special and dangerous kind of work Barnes has to do."

"Notice the way those single-bladed props are faired into the leading edge of the wing. And right diagonally below

the props are the openings for the air-cooling radiators. Those little bulges beneath the wings are the vertical exhaust ports. Those black strips along the leading edges of the wings and the stabilizers are rubber de-icing boots. The rest of the ship is finished in stainless steel.

"Folks, isn't she something to look at? Young Sanders rides in the after cockpit where he has a .50-caliber Browning to keep ships off their tail when on special missions for the government. Barnes has named this new ship the Charger. And the name fits. There comes the starter's arm down. Now watch that forward nose wheel and the two main wheels retract up into the belly of the ship after he is off the ground.

"Good luck to you, Bill! And to you, Blow-me-down Sanders!"

Bill Barnes threw the switch on his intercockpit telephone after he had plugged in his jacks and spoke to Sandy while they waited for the starter's flag to fall.

"Everything all set, kid?" he asked as calmly as he could.

"Okay, Bill," Sandy said. "Let her ride."

Bill released his brakes, and poured soup into the twin 1500 h. p. Diesels. The big ship began to roll as the crowd let out one terrific cheer. Faster and faster it sped down the runway. The people along the edges of the field became dim blurs as Bill eased back on the wheel and took the shining monster off the runway with a skill and verve for which he was justly famous.

The Charger became a shining bullet as Bill laid the nose on the half dozen pinpoints ahead that were fast disappearing out over the Pacific.

IX—PAST NEW CALEDONIA—

BILL'S eyes were glued to his flight and engine instrument panels as he took her up to 15,000 feet, where the twin Diesels would give their best performance. He checked off his position on his charts and made contact with Shorty Hassfurth in Alameda to report it and get a weather report.

All the other ships had disappeared from sight when he flipped his intercockpit telephone key and spoke to Sandy.

"I'll hold her until we're past Honolulu," he said. "We have a slight head wind—twenty miles. I'm going to hold her at an even three hundred m.p.h. You'd better get a nap if you can."

"Gosh," Sandy said, "I couldn't sleep, Bill. Say, did you notice the way that guy Slade was looking the Charger over when we wheeled her out? He's a tricky-looking guy."

"Yes," Bill said, "he's a louse. I noticed him. He drew the thirty-fifth

THE CHARGER GOES TO SYDNEY

A COMPLETE BILL BARNES AIR NOVEL

BY GEORGE L. EATON

position. He'll never see the Charger again until he sees her in Sydney."

A little over three hours later Bill shot a "sun sight" to check his compasses and eased his throttles back to about sixty-five per cent. The wind had shifted and was on his tail now.

Every half hour he had been talking to Shorty back at Alameda, giving his position and the weather so that Shorty could check it against the forecast. At the same time Shorty took a radio bearing to cross-check the position Bill gave him.

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

"Right," Bill said. "I'm going to throw the controls to Sandy after we pass Honolulu and try to get a rest. We may run into almost any kind of weather down in the South Seas. I'm signing off."

The crouching lion that is the extinct crater of Diamond Head flashed under the wings of the Charger—then the naval air station, as they sped above Honolulu.

"All right, kid," Bill said. "Will you take her?"

"Okay. What time do you think we'll be able to sit down at Sydney?"

"About seven o'clock this evening. About dusk."

"But I thought we lost a day when we went over the International Date Line," Sandy said.

"We do, but we're flying west with the sun. We'll make up the day we lose while we're in the air."

"Oh, boy," Sandy said, "we get there the same day we left, yet we lose a day. That's a tough one to figure out."

"Don't try," Bill laughed. "I'm going to crawl in and get a nap. You're going to strike a cloud wall. Don't try to run around it. Go through. Call me if you need me."

"Right," Sandy said. "I'll take radio bearings if it closes in. I can get a fix on those destroyers down below."

An hour later Sandy stuck the nose of the Charger into a front, or cloud wall, that rose thirty thousand feet from the surface of the Pacific. Rain and wind tore at their overhead hatches and a sudden gale slapped the Charger up and down like a piece of driftwood on an angry sea.

From the dials on the instrument panel came a ghostly phosphorescent

glow. Sandy could barely see the navigation lights out on the wing tips as the storm closed in, and a wrench and twist dropped the thundering ship three hundred feet.

Bill, held down by the broad safety belt across his body, stuck his head over the end of the tubular bunk on which he was resting in the gangway between the two cockpits, and asked Sandy if everything was all right.

"Just a little bumpy," Sandy grinned. "Go on back to sleep."

He flipped his radio switch and began to chant Shorty Hassfurth's call letters into the microphone. The wail that came back to him nearly broke his eardrums. He closed the switch with his eyes roving over his instrument panel to come to rest on his artificial horizon, where the tiny plane silhouette danced and bounced in unison with the Charger. His arms ached from trying to keep the big ship steady on her course. He was fighting a cross-wind that made it doubly difficult to hold his true course.

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

Then, with scarcely any warning, the Charger popped out on the other side of the front, and Sandy found that the wind had shifted one hundred and eighty degrees. One moment they were inside what seemed an endless vault of fog, and the next there were clear, sunlit skies ahead with almost unlimited visibility. He nosed the Charger down, hoping to pick up a more favorable wind at a lower altitude.

When Bill took the controls back an hour later they were above the first of those coral reefs and islands that glisten like white jewels on the face of the Pacific and are known as Polynesia.

On and on they sped, hour after hour, relieving one another at the controls at the end of each hour, checking their position against the tiny islands that flashed below them. Not once did the gallant Charger falter. The two-stroke, compression-ignition Diesels in the wings sang their muted song with never a hint of hesitation. Steadily the Charger seemed to gather new life because of her lightened fuel load.

When they were above Noumea on New Caledonia, Bill picked up station VK2ME at Sydney and asked for a report on the race.

"From what we have been able to learn," they said, "Cochet and Montaine are a little ahead of you. Also Slade in his Rapier. The rest are strung out from here to Honolulu. Only three ships down at sea."

"Thanks," Bill said gruffly and signed off. "Listen, kid!" he snapped at Sandy. "We've got to pour in the speed now. There are two ships leading us. We've got to win. I've got to have that prize money or—or—"

He didn't finish the sentence because of the sudden fury and unexpectedness of the attack that came from nowhere. One instant they were alone in the sky, and the next they were surrounded by a half-dozen snarling monoplanes that were trying to pour leaden death into their vitals.

"They came out of those clouds just above us!" Sandy screamed in Bill's ear. "There are six of them!"

"Break out your gun! Give 'em hell!" Bill roared. "I've been half expecting something like this. Hold on! I'm going upstairs!"

But the six olive-green monoplanes that had dived on them would not let him go upstairs. They were here and there and everywhere, forcing him to keep the nose of the Charger down while he rolled and skidded and sideslipped to get out of range of their fire.

Young Sandy leaned forward and worked a control. The low, transparent whale-back extending aft of the gun track in the after cockpit turned smoothly on its longitudinal axis and disappeared into the fuselage. He yanked the heavy .50-caliber Browning into position and reached down and disengaged the sliding gunner's seat. As a ship zoomed above his head his seat moved forward and down and the gun swung upward. With the Browning barrel almost vertical, Sandy was on his back in the tilted chair, his eye glued to the ring sight. His finger came down on the trip and the heavy gun belched fire and flaming death. His bullets tore through the belly of the olive-green ship overhead. For an instant it seemed to hang in the air on a thread. Then yawed wildly off on one wing and stuck its nose downward toward the Pacific.

"Nice going, kid!" Bill shouted into his microphone. "They're not trying to hit us with their bullets. They have the nose of the Charger in a cross-fire. They're trying to get the ship. Buckle on your car pads, kid. The Charger is going to Sydney. I'm going through them!"

Bill took the Charger through their line of fire and brought it up and over in a loop. At the top he centered his controls, then rolled right side up. Then

he whipped up again and came back in a climbing turn with his guns roaring. He went, head-on, into the olive-green monoplanes with the wild abandon and speed of a hurricane. His fingers were fastened down hard on his gun trips. He raked the first green monoplane with a withering fire. He saw the pilot rise up in his seat as though he was on springs, then fall back with his arms flailing the air. The ship skidded off to the left and almost rammed one of its mates before it went spinning downward to oblivion.

Bill gunned the Charger again and came over in a normal loop on the tail of another green ship. His line of tracer smoke curled above the head of the pilot. He shifted his fingers and clamped down on the trigger of his 37mm. cannon. The explosive shells struck the engine block of the green ship, detonated. Orange flame and black smoke and debris were one for a moment. Then the smoke cleared, and what had been a fast, rugged monoplane was a hundred pieces of metal and wood with a man's shattered body amidst it.

Then the air seemed to be choked with snarling, green flies that roared and buzzed and darted in and out as they tried to circle their prey and get it in the vortex of their fire. All thought of forcing the Charger down had gone from the minds of the three surviving pilots. They were fighting for their lives. But they were afraid of their prey, whereas to Bill they were only three pilots who had tried to shoot him down in cold blood.

He cursed as he felt their bullets driving through the stainless steel skin of his new Charger. He knew that the Charger was taking a terrific beating and the thought of it nearly drove him mad.

"Hey!" Sandy screamed in his ear. "Give me a shot at them!"

Bill didn't answer. The three green ships were circling round and round him, trying to keep out of range of occasional bursts from his 37mm. cannon and at the same time direct their fire at him.

Then he got another green ship under his nose for that fleeting instant which is enough. His finger clamped down on the electric trigger of his .50-caliber machine guns and they drew a path of death from the nose to the tail of the ship as it flashed under his guns.

Bill's breath was coming in short, agonized gasps now. His hands bulged, he gripped the wheels so tightly. His eyes were mere slits in his bronzed face. He used his guns only when he had a green ship dead under his sights. He was employing all his inherent skill and all the terrific power and maneuverability of the Charger to keep the two remaining ships from making a sieve of it.

He blasted another green ship out of the sky with his cannon, and that left but a single opponent. He expected to

see him peel off, and turn tail. But the pilot of that green ship continued the attack, matching Bill's every move with a counter-move that left him breathless. The two ships streaked and tumbled through the heavens, firing burst after burst without effect. Bill's teeth were clenched so tightly his jaws ached. He recognized the other man as a master pilot.

Again they came at one another at terrific speed. But this time Bill anticipated the man's change of direction and the two ships almost collided, they were so close. Hastily Bill corrected his aim. One instant he could see the enemy's face behind the windshield of his ship, the next it dissolved into black smoke and orange flame. Flames shot out from the ship in every direction as the gas tanks exploded. What was left of it tumbled over and over to the rolling waters of the ocean below.

Bill dove the Charger toward the surface of the Pacific to comb it for a possible survivor of the battle. Nothing but floating debris came to sight.

"Blow me down!" Sandy said in his ear. "Where did they come from?"

"I don't know," Bill snarled, "but if they make us lose the race I'll have Slade's scalp."

"What does Slade have to do with it?" Sandy asked.

"Shorty picked up some rumors about Slade and the race," Bill said. "He talked too much—or a man named Lucas who works for him did. They were going to stop me so Slade could win. They wanted the Charger too."

"But—" Sandy began.

"But nothing," Bill snapped. "Close your hatch. We're taking the Charger to Sydney!"

Bill climbed the big ship until he had fifteen thousand feet under him. At that altitude he eased open his throttles and kept his eyes roving over his instrument panel. He saw his airspeed indicator cross three hundred and ten, three-fifty, four hundred. At four hundred and twenty miles an hour he eased off a little. His face was a grim mask of concentration as he probed the air ahead of him while the Charger took them toward their goal at over eight miles a minute.

"She'll never be able to stand it, Bill!" Sandy screamed in his ear.

"She's got to stand it," Bill growled back through set teeth.

Once it seemed that the Charger was going to shake herself apart. But Bill nosed her up until she stopped vibrating. Then dropped the nose again and opened his throttles wide.

The minutes raced by as the Charger rocketed faster and faster onward toward the goal somewhere in the blue haze ahead. Both Bill and Sandy watched intently for the two ships still reported ahead of them. (Turn to page 88)

Model Making

IN RETROSPECT

Within the two summer months just passed we have witnessed two contests of national importance: the 11th Annual National Contest at Detroit and the annual Junior Aviator National Air Races at Akron. Both these events drive home the militant fact that our hobby is over the top, meriting the respect of the general public that a national hobby should.

We have seen recently the gas-model phase of the hobby featured in LIFE magazine, bringing to the attention of parents throughout the land that model building is a thing not to be discouraged as a waste of time, but rather an educational influence to be fostered by everyone whose responsibility it is to supervise the activities of those younger than themselves.

Endeavoring to emphasize the beneficial environment of model building, Air Trails has reported both in pictorial and text forms the "human side" of the 11th Nationals. In doing so the editors sincerely hope that a weapon has been forged that will enable our readers to discuss intelligently with their parents their model building activities.

To prepare the coverage of the Nationals in a manner that would impart the human interest angle, William Winter and Gordon S. Light flew to Detroit. With them was Albert E. Daraghy, whose photographs taken especially for Air Trails appear in "The 1938 National Contest," and "Not on the Program."

AIR TRAILS DEPARTMENT OF PRACTICAL CONSTRUCTION

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THE 1938 NATIONAL CONTEST

From July 6 to 9 was held the National Contest. Rather than report the event in the conventional drab manner, Air Trails withheld publication an additional month to arrange a coverage stressing the "human" side of the meet.





Top, left—Jim Cahill was high man in the Wakefield elimination; he later won in Paris.

Top—Mr. and Mrs. Alan Booton flew gas jobs. Alan placed; scared the Mrs. would trim him?

Top, right—Arthur Beckington, quietest modeler, placed first on the American Moffett team.

Left—Fiske Hanley, '37 Texaco winner, brought a beautiful ship this year but failed to repeat.

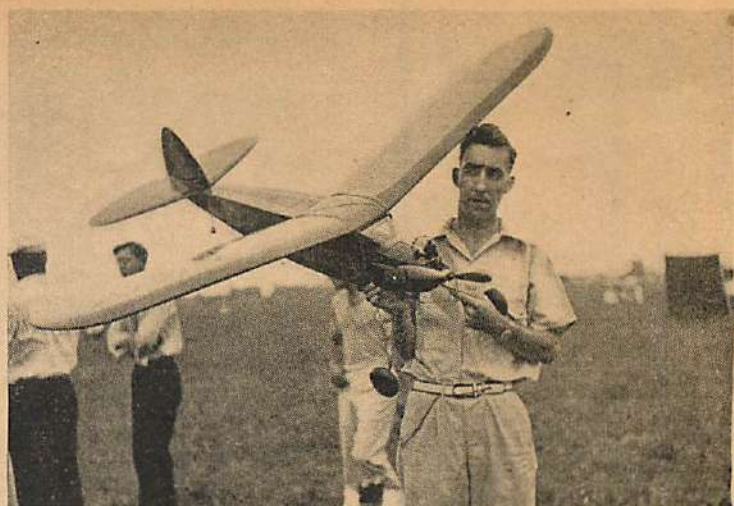
Right—The famous Frank Zaic smile. Photo taken just after an 18-minute flight over field.

Bottom, left—Wallace Simmers suggested this picture before flying. Flight was 9:25.

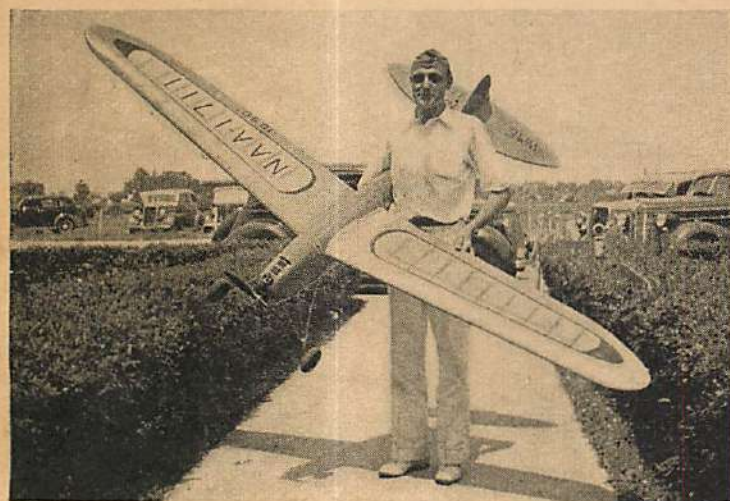
Bottom—Bill Effinger, of Buccaneer and Cavalier fame, astride a gas-powered bike at meet.

Bottom, right—Henry Stigelmeier drove from California. He placed on Wakefield team.





Top, left—Roy Marquardt and Frank Broeg of Iowa with their unique twin-engined job. Roy was the designer of the "Riser Rider" in June issue. Is prominent in experimental work.



Top—Harold Coovert, Dayton, was Berryloid winner. His ship was a marvel of neat, practical construction as well as finish. Finish was so smooth that pin-striping was done with ruling pen.



Upper, left—Carlson and his Cavalier had the toughest break of the contest. Ship had high time in the open gas until just ten minutes before deadline. Winning flight was made in a high wind.

Lower, left—A contestant holds Ben Shereshaw's neat pusher. Old-timers gleefully named it "The Woman Chaser." It seems that at previous Nationals a fat lady was victim of the pusher.

Bottom, left—Pat Sweeney from Chicago had this radio-equipped Cavalier. Unfortunately, the high wind that blew up before radio event caused all entrants but one to prefer not risking a flight.

Bottom—Carl Goldberg with his latest parasol gas job. This model successfully made its first flight 10 minutes before the deadline. Carl was a gas winner at Mississippi Valley Meet.

Right—"Spirit of the 1938 Nationals" seems to describe this striking photograph of Frank Kietwitz, Detroit, and his gull-wing gas model. Mono-wheel is mounted in streamline housing.





NOT ON THE

The 11th Nationals in retrospect, of the model builders'

A \$100 bus bought by the delegation from Trenton, New Jersey, provided transportation to Detroit. Unfortunately, they did have a little trouble pushing it over the Pennsylvania mountains.

Flop-back or folding propellers were widely used. They worked smoothly and seemed to improve soaring flights.

If the runways on the airport had been rubber cement instead of the harder variety, there would have been fewer broken motors. Grass and gravel proved hard enough, but the concrete showed no mercy at all.

The Tulsa boys were missing. Dague, Luckett, Wriston, and the others couldn't get to the contest. Dague was coming if he didn't get a job. (He got it).

Many of the older contestants brought their wives and families. What was previously an affair for young fellows is fast turning into an event for everyone—a healthy sign.

During the meeting of the Academy for Model Aeronautics in the Hotel Fort Shelby, someone exploded firecrackers outside the windows. Fully a dozen A.M.A. members were awakened from the soundest sleep they had had in days.

Walter Good had tough luck with his radio-control job. He was the only one with courage to brave the windy weather. Launching his model from high grass

Leslie Adams from down Georgia way came as representative of his local club. He regaled the boys with the tale of a baby alligator hunt. Had more success with the 'gator than with the model.

The model with variable dihedral—steadily increasing as the model climbed until the two wing-halves folded together and the model power-dived from several hundred feet.

The slapstick movie routine of two Cleveland entrants who were hitting each other on the head and other parts of the anatomy with the remains of their cracked-up gas jobs.

The crossed fingers and anxious look of Robert Toft of Minneapolis who made the high time of 6:10.4 during the first day of the gas contest. He didn't cross enough fingers—his time was beaten twice the following day and he placed 3rd instead of 1st.

The smile on Billy Sleeman's face—he won the Aeronca "chanced off" to help finance the meet.

Lending his moral support to the owners of crashing gas models was our model editor, Gordon S. Light, here shown in a momentous discussion on technicalities. Oh, for the life of a model editor!



PROGRAM

*recalling the humorous sidelights
annual four-day "picnic."*

he accidentally changed the setting of the elevator control tab. Despite his 100-yard dash to the transmitter, the model stalled and dove in before he could do much about it.

The easy-starting, smooth-running, four-cycle single-cylinder engine exhibited by a Chicago builder was the outstanding development in motor design.

There was one sure way of finding anyone at the airport. Just make a tour of the soft drink stands.

Canada's demon hitch-hiker, John Dilly, refused a ride with the delegation from Toronto. His streamline thumb brought him to Detroit in record time.

Gordon Light and William Winter, who came to the meet as representatives of Air Trails, unintentionally made themselves some nice new enemies when a group from New York asked them a frequently heard question: "How long did it take *you* fellows?" The A. T. boys answered truthfully, "Four hours. We flew." It seems that the New York group, plenty tired and hot after their trip, had come by car, enjoyed two blowouts, and were thirty-six hours in crossing.

Contestants from Denver found their models to be poorly adjusted despite the preliminary testing done at home. Little wonder, though, since Denver is at an altitude of about 5000 feet while Detroit is practically sea level.



Bert Norman hails from Vancouver, over 3,000 miles away from Leslie Adams on the opposite page. Nearly 1,000 entrants came by everything but horse and buggy from all points of the compass.

Two very young spectators broke into tears when they saw a particularly nasty crack-up. Tearfully they told their parents—It's broken. . . . Won't fly any more.

How times have changed! A few years ago models were checked and weighed before flying. Now they're *processed*—a new name for the old routine.

Sunday, July 10, the contestant reluctantly packed up and left Detroit amid such remarks as: Ouch, my sunburn! . . . I'll do better next year. . . . If only I had hit a thermal. . . . Gosh, I'll have to go back to work Monday. . . . If I hadn't tried to put in those last few turns! . . . The timer's watch must have stopped—it seemed much longer than two minutes.

Shh! Not so loud. Our demon Associate Editor, William Winter, engrossed in the tremendous details inherent in covering the Nationals. (He said he was watching Zaic's model in a cloud).

FLIGHT RECORDS AND CONTESTANTS IN COMPETITIONS.

model

THE 1938 NATIONAL CONTEST

One of the most impressive angles of the 1938 national meet was the nationwide representation of builders. A list of the states and cities represented would read like a lesson in geography. The Canadian boys were on hand to make the contest complete. Missing were the proxy models of the New Zealanders. Competition in the Moffett International was confined to American and Canadian entrants. Roy Nelder of Toronto won the trophy—which satisfied everyone—and certainly the Canadians. James Cahill, 1937 Moffett winner, didn't mind losing the trophy. He won first place on the Wakefield team and a trip to France for the contest. And the latest news from France is that Cahill has won the Wakefield contest. Thus that famous trophy comes to this country for the third time.

For the third consecutive year the outdoor events at the national meet were flown at Wayne County Airport—about 16 miles outside of Detroit. Facilities there are ideal. There was one sore spot, however. A neighboring farmer did a thriving business selling back models which landed in his fields. The wind cooperated nicely with his nefarious activity, since it blew the models directly over his farm. Those that fell short had to be bailed out at a varying scale of prices. Models from a wheat field cost 25 cents, corn field 20 cents, and so on. Unhappy modelers returning from their dealings with Farmer Brown quoted the current prices and made the airport seem more like a stock exchange than a model meet.

Flying weather on the first day of the meet left nothing to be desired. On Wednesday, July 6, flying got under way with cabin fuselage and the Wakefield elimination events. The flights turned in compared favorably with last year's records despite the rule changes—no following models and no binoculars to keep them in sight.

Each year the climbs become steeper and faster, glides become flatter, and rubber motors get bigger. Winding the powerful motor becomes a strenuous job. The expressions on the modelers' faces as they store in the last few turns indicate the worst in physical and mental agony. However, they are



Top—Prominent among those who promote the hobby is Pat Sweeney, shown at his gas meet, Edward Hines Airport, Chicago. Pictured here are three gas jobs.

Center—Winners of the Toledo News-Bee Model Airplane Meet: Left to right—C. Myers, T. Espenship, J. Olson, M. Roll, E. Nadzius, J. Tighe, A. Schilperroot.

Left—Mr. Hugelot viewed in his capacity of weighing in gas models at Pat Sweeney's Chicago contest. His son, Milton, is the present national champion.

matters

CLUB NOTES AND
NEWS OF MODEL
ORGANIZATIONS.

practically always repaid by the speed with which the models get upstairs.

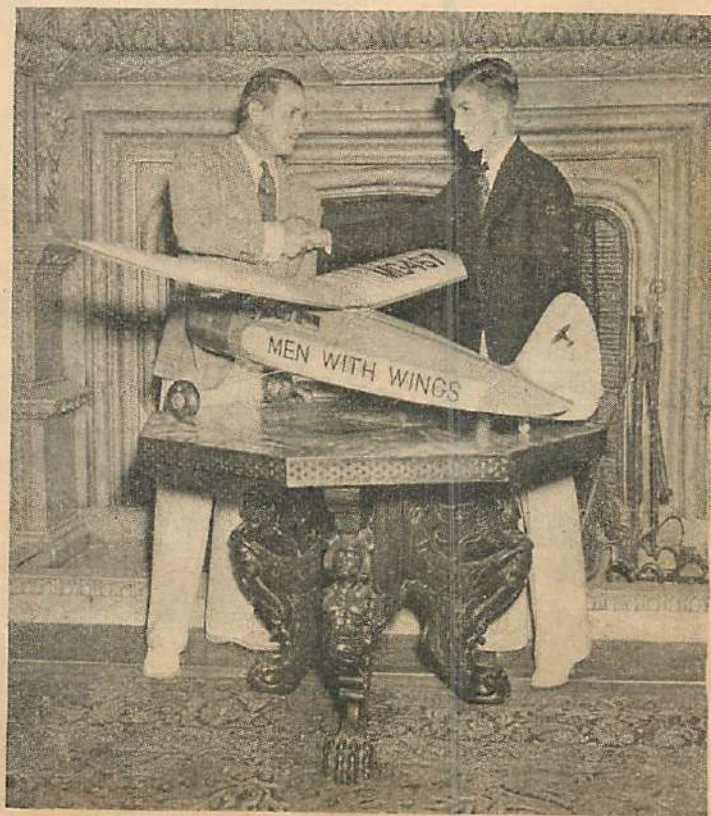
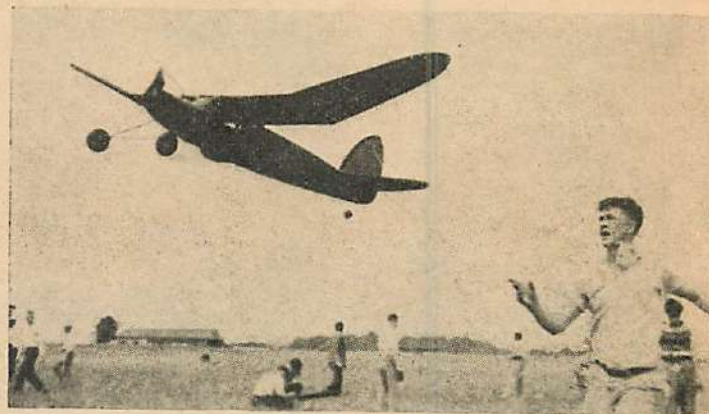
It was surprising how many of the top-place models were veterans with a full quota of patches and repairs. This is a compliment to the model fraternity since it proves a good model is really durable and thrives on a diet of steady flying. Typical was the Clodhopper II—Cahill's winning entry in the Wakefield eliminations. He lost this same model on the winning Moffett flight last year at Detroit. It was unreported until November. Four months in the open had done surprisingly little damage. After some repairing Clodhopper II was still the best model to the tune of 8:11.5 for the three-flight average.

Frank Zaic of New York City won the open-class outdoor cabin event with a flight of 17:06.2. Striking extremely favorable currents the model stayed directly over the field, finally landing not more than several hundred yards from the launching spot. Other modelers were less fortunate. Many ships drifted out of sight after 4 or 5 minutes.

Arthur Beckington of Rockford, Ill., won the Stout Trophy. He is a mighty capable builder. Since he's still in the junior class, the hobby should be hearing more of him in the years to come. Rockford seems to produce Stout winners—Roy Stoner of the same city having won it last year. Leo Bailey of Akron was runner-up in the Stout event with 23:35.8.

The Moffett team of six was selected by taking the highest ranking in the cabin fuselage event. The finals in the Moffett were run off the second day of the meet, July 7. Roy Nelder of Toronto was high with 5:17 when flying ended for the day. Roy's model was well designed and neatly built. He had adjusted it to perfection. The outdoor flying season is late in reaching Toronto, and the Canadian boys must work fast to get their outdoor models adjusted before the national meet.

A brisk wind made flying a trifle difficult Thursday afternoon. Nevertheless, the flying scale model contest got under way as scheduled. Henry Struck of New York City won the open class with a flying scale model of the Caudron. Leo Bailey took the senior division with a Fokker D-7.



Top—Way back in June the Quaker City Gas Club held one of their frequent contests. This very unusual shot shows a contestant getting off a Red Zephyr.

Center—Also entered in the same Quaker City meet, Edwin Godshall flew this cabin biplane. Edwin is a member of the Quaker City Club, fast gaining repute.

Right—Reginald Denny congratulates Bud Chapman of Bakersfield High School, California. Bud won funds from Paramount to enter the Scripps-Howard contests.



Top—A very active model group operates in Pittsburgh. This picture taken at a contest during the early summer shows contestants waiting their turn to fly.

CONTEST CALENDAR

READERS AND CLUBS. Notices should be mailed to the Contest Calendar, Air Trails, 79 7th Ave., New York City, 5 weeks in advance.

FIRST ANNUAL OPEN MEET, Hadley Airport, N. J., September 17th. Sponsored by Queen City Gas Model Club of New Jersey. Will be held under N.A.A. rules and all entries must be N.A.A. licensed. For application and information write Frank Boyd, Queen City Gas Model Club, 1800 Myrtle Avenue, Plainfield, N. J.

NORTHERN INDIANA CHAMPIONSHIP MEET, September 18th. Sponsored by Northern Indiana Gas Model Association, N.A.A. rules. Limited Engine Run Consistency Event. Entries limited to N.I.G.M.A. members. For information address Bob Roberts, Contest Director, 4490 Broadway, Gary, Ind.

FIRST ANNUAL TRI-STATE MODEL AIRPLANE CHAMPIONSHIPS, Pittsburgh-Butler Airport, September 24th. Sponsored by Tri-State Model Association, N.A.A. sanction. Events include Gas Models, fuselage type, and Rubber-powered Fuselage Models. Prizes consist of trophies and valuable merchandise awards, including motors, kits, magazine subscriptions and model supplies. Wing loading of gas models must be 10 oz./sq. ft., and for rubber-powered models 3 oz./100 sq. in. of projected wing area. Maximum weight of gas models, 7 lbs. Rules, regulations and entry blanks may be secured from Tri-State Model Association, 524 Griffin Street, Pittsburgh, Pa.

STATE-WIDE MINNESOTA CONTEST at Minneapolis, September 25, sponsored by Minneapolis Model Aero Club. For further information address Bert Pond, 5433 Second Avenue, S., Minneapolis, Minn.

GAS MODEL CONTEST, October 2nd. Sponsored by the Trenton Petroleers. Flying site is Mercer County Airport. Information from WPA Recreation Division, 212 Centre Street, Trenton, N. J.

Upper center—Four girls entered the Chicago gas model contest to challenge the "experts." Left to right—H. Stoffer, M. Thorwaldson, G. Shrer, R. Konefes.

Lower center—G. R. Sherod of the Chicago Aeronauts hand-launches his Monocoupe in the Northern Indiana Model Airplane Builders Contest, attended by 8,000.

Left—This monster contest proved that gas modeling in northern Indiana and thereabouts is a man's game. Here we see Fox Movietone News right on the job.

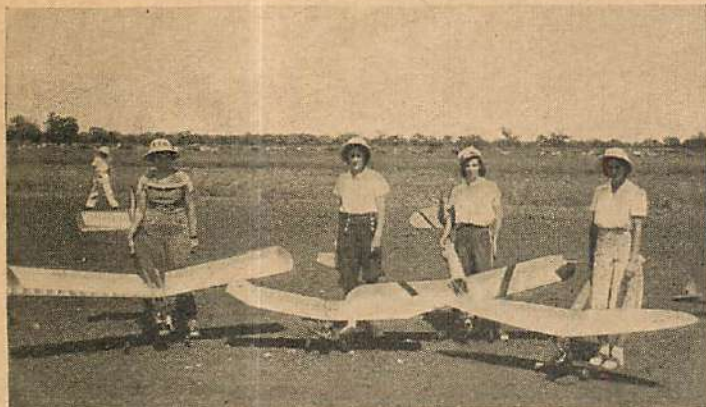
THE QUESTION MARK

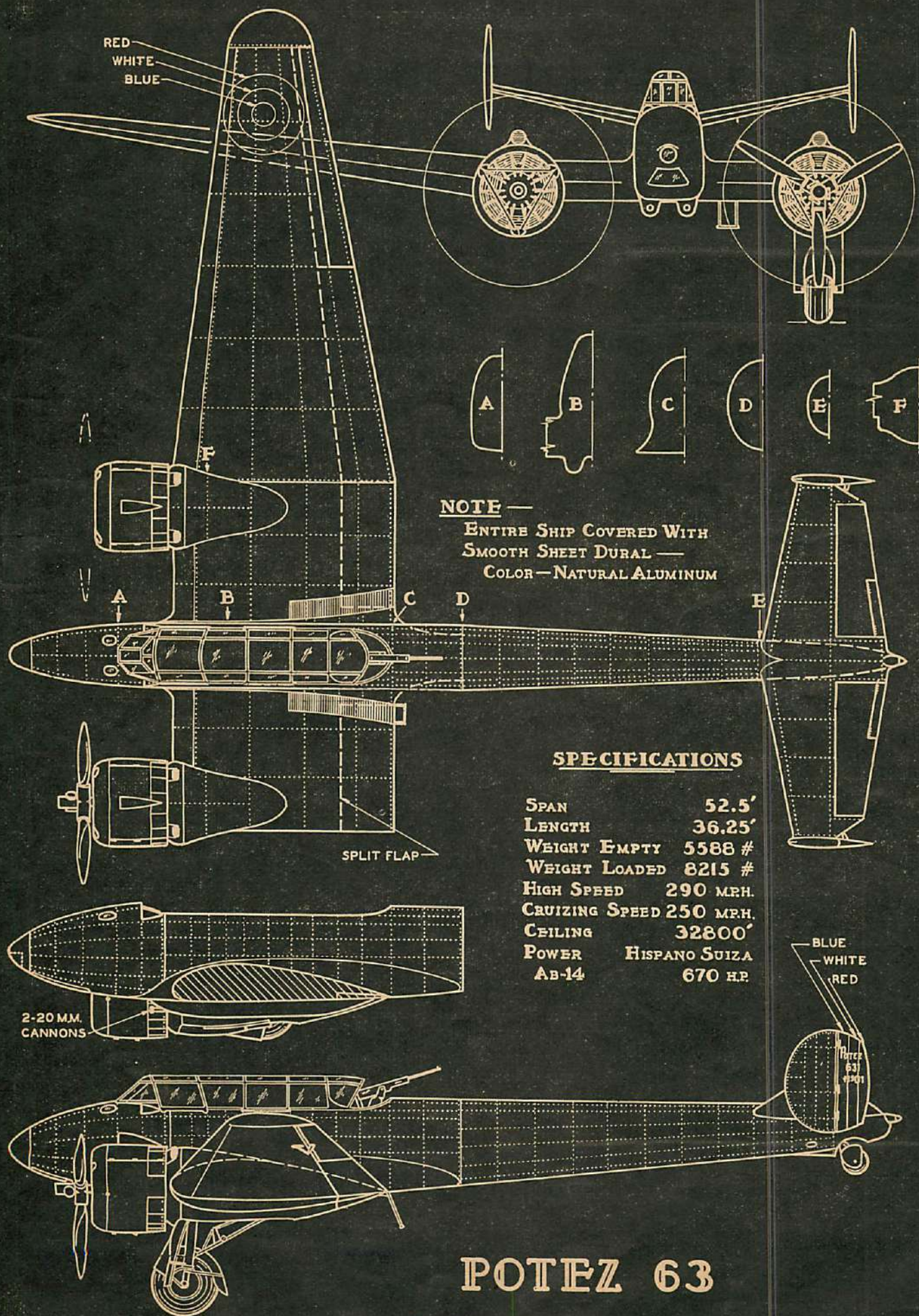
All questions pertaining to model construction problems should be addressed to Gordon S. Light.

Answers will be given promptly by mail, thus avoiding delay.

Enclose self-addressed stamped envelope to insure answering.

Winners were determined on a point system based on appearance, scale, and flying ability. There was considerable comment on the method of awarding points. With the increasing interest in this event, a more satisfactory set of rules will be necessary. It would also seem (Turn to page 95)





POTEZ 63

DAY & NIGHT FIGHTER

SCALE $\frac{3}{16}$ " = 1'

THE VALKYRIE

Completing this graceful and proven gas job—Part II.

By Carl Goldberg



Multispar construction is used in the wing and tail surfaces. This system makes a strong, lightweight wing—the completed wing weighed 20 ounces. Practically any portion could have been destroyed without affecting the strength of the wing as a whole. While this construction is not difficult, it is tedious—there being over 1,100 individual pieces in the wing alone.

WING CONSTRUCTION

Specifications of the wing are: span 10'; root chord 20"; aspect ratio $7\frac{2}{3}$ to 1; area 13' square; dihedral 10" under each tip; double elliptical taper; original Goldberg section; and 2° incidence.

Figure 2 shows the method of laying out double elliptical taper. Follow this method for making a full-size wing layout. From this layout you can determine rib lengths, leading and trailing edge curves and a variety of other details available only from a full-size drawing.

Full-size ribs are given in Figure 1. Cut a template to the shape of the top camber and another template to the shape of the bottom. Slice the top and bottom portions from $\frac{1}{8}$ " flat balsa to a width of $\frac{1}{8}$ ". Cut off at the trailing edge as necessary to fit ribs to taper of wing.

Procedure of the work is as follows. Pin the pre-bent leading edge, trailing edge, and the tip pieces—minus reed—to the drawing. Next add the top ribs. Stand the wing on the root rib and add the bottom rib. Cement

spars in position to the ribs, add rib bracing and finally the diagonal bracing between the ribs.

The original wing was made in two separate halves and joined before covering. However, the ten-foot span made it difficult to carry it from place to place. A device whereby the wing could be folded in the center would be helpful.

A diameter reed of $\frac{3}{16}$ " is countersunk halfway into the balsa wing tips. Taper the thickness of the trailing edge to match the varying depth of the wing camber. Cement the two halves of the wing together, matching the ends of the spars, leading and trailing edges. Add the $\frac{1}{16}$ " sheet covering to the top and bottom of the center and the tips. Cover the entire wing with heavy bamboo paper. Two coats of thinned clear dope are then brushed on the covering, followed by two coats of thinned yellow.

WING MOUNT

This method of mounting the wing was worked out several years ago. It permits the wing to detach from the mount upon any heavy impact, thus saving it from damage. The mount is shown in Figure 4. The framework is built exactly like the upper rudder with the same specifications for material and the same section. The first step is to cement ten pieces of $\frac{1}{8}$ "x2x4" to the bottom of each half of the wing. These pieces form the platform in which the wing rests. It must fit the bottom surface of the wing snugly.

The platform is supported by a balsa backbone $\frac{1}{4}$ "x1x20" cut to fit the undercamber of the wing and cemented to the bottom of the platform. Build up the

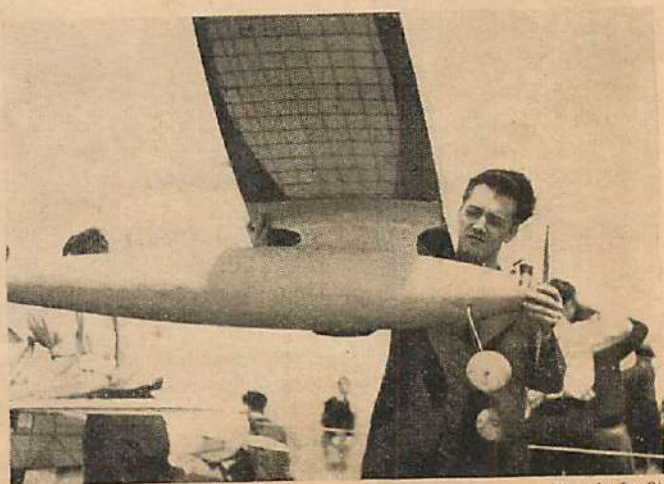


Photo by Joe Ott

Carl Goldberg holds the Valkyrie aloft to display the multispar wing and the streamlined, built-up mounting. The engine is Gwinn.

FIG. 1 FULL SIZE

$3/8 \times 3/8$ "

$1/8 \times 1/8$

CENTER WING RIB
CUT TEMPLATE TO THIS SHAPE AND SLICE TOP & BOTTOM
PORTIONS OF RIB FROM 1/8 FLAT BALSA CUT OFF AT
TRAILING EDGE AS NECESSARY

$5/16 \times 1 1/4$ "

RIBS CUT SAME AS THOSE IN WING

CENTER STABILIZER RIB

$1/4 \times 1/4$ "

$1/4 \times 1$ "

$1/8 \times 1/8$

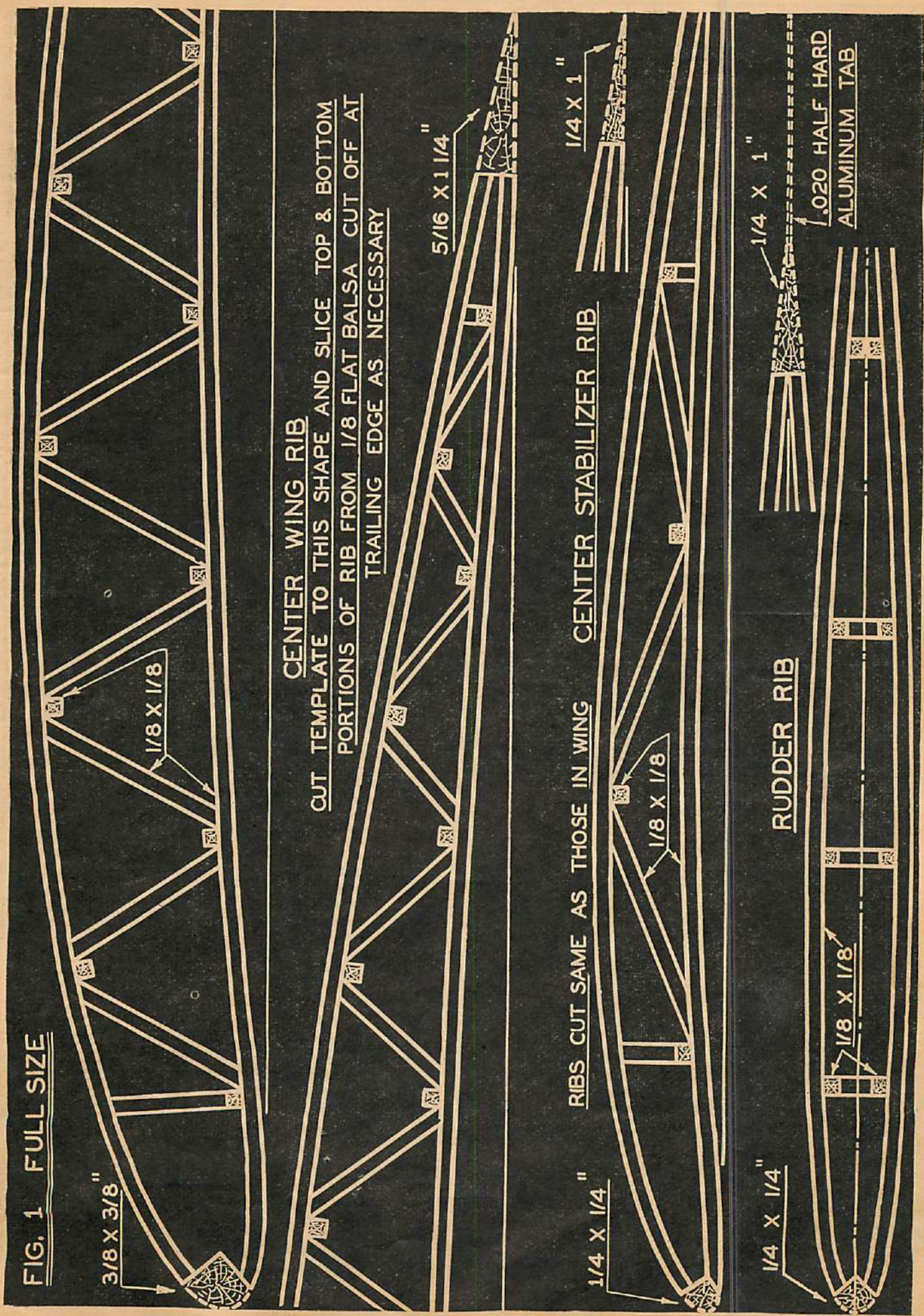
$1/4 \times 1/4$ "

RUDDER RIB

$1/4 \times 1$ "

.020 HALF HARD
ALUMINUM TAB

$1/8 \times 1/8$



rudderlike framework and attach it to the platform and the backbone. Note that the bottom rib of this framework must fit the top of the fuselage. $\frac{3}{8}$ " incidence is used for the 12" chord, which gives $\frac{5}{8}$ " for the 20" chord of the wing. Figure 4 is dimensioned to include this incidence. However, if you didn't follow the drawings of the fuselage closely, you had better check up on the incidence, since Figure 4 is dimensioned from the fuselage data given last month.

ATTACHING WING MOUNT

The model should be nearly completed and assembled before attaching the wing mount. In this way, the location can be determined, depending on the center of gravity location, which should fall at a point 45% or 9 inches back from the leading edge of the wing.

Holes are drilled through the skin and the wing mount floor (inside the fuselage). Insert the ends of the spars, leading and trailing edges with the bottom rib resting atop the fuselage. Secure with cement to the wing mount platform and the skin. Cover the wing mount with 1/16" sheet balsa. Add soft balsa fillet-blocks to the corners and sand with rough sandpaper wrapped around a circular block. Finish off with fine sandpaper. The photos show the fillets clearly. Bend and insert wire attachment hooks. The wing is held to the mount by rubber bands passing around the front fitting, over the top-center of the wing and fastening to the rear hook.

STABILIZER

Specifications of the wing are: span 4'; 12" root-chord; area 3' square; double elliptical taper; original Goldberg section; incidence $\frac{1}{2}^\circ$ negative; and area equal to 23% of the wing.

The stabilizer is laid out exactly the same as the wing. That is the chord and span dimensions of the stabilizer are substituted in Figure 2. As in the case of the wing, a full-size layout is essential for good results. The method of construction and the steps in the procedure

are similar to those used in the wing. Build in two halves, complete except for covering, and insert the ends of the spars through holes drilled in the skin covering at the rear of the fuselage. Coat the spar ends liberally with cement before inserting them. Also cement the end rib of each half of the stabilizer to the side of the fuselage. Add $\frac{1}{32}$ medium sheet balsa to the top and bottom of each half of the stabilizer—as indicated in Figure 5. Cover with bamboo tissue and dope first with thin clear dope, followed by one or two coats of thinned yellow.

RUDDER

Specifications of the rudder are: upper rudder 9" high, 12" root chord; aluminum tab; lower rudder 4" high, 12" root chord; sheeted with $1/16$ " balsa; multispar construction; streamline section; area equal to 6% of the wing area.

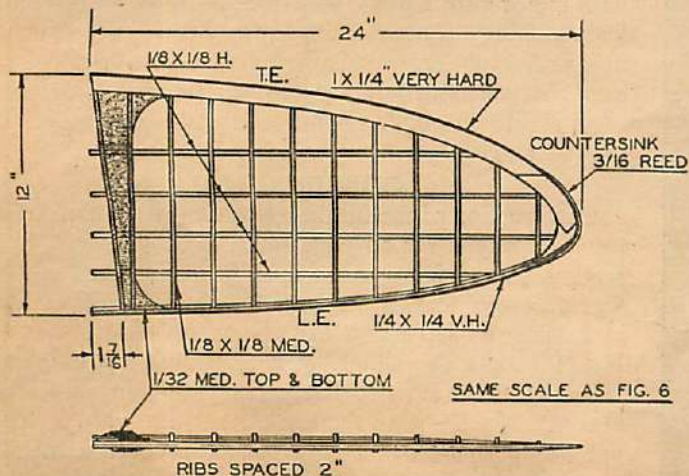
Figure 6 is the drawing of the upper and lower rudders. The upper is a double elliptical taper—the same method used in laying out full-size shape as in the wing and stabilizer. The lower rudder shape is shown in greatly reduced size in Figure 6. However, the drawing is accurately made to the indicated scale and the essential points have been dimensioned. Draw up your full-size outline from this information.

The two portions of the rudder are made separately and added to the top and bottom of the fuselage in the same way as the stabilizer. Insert the cement-coated ends of the spars and edges through holes in the skin covering. Also cement the end ribs to the outside surface of the fuselage.

The movable rear portion of the upper rudder is a piece of .020 half-hard aluminum. The tab is piano wire hinged to the trailing edge of the rudder. Alternate portions of the rudder and the tab are cut away to form the type of joint indicated in Figure 6. The edges of the aluminum are rolled to as small a radius as possible and a piece of piano wire inserted. The wire is secured to the top and bottom of the rudder and at (Turn to page 80)

FIG. 5 LEFT-HALF STABILIZER

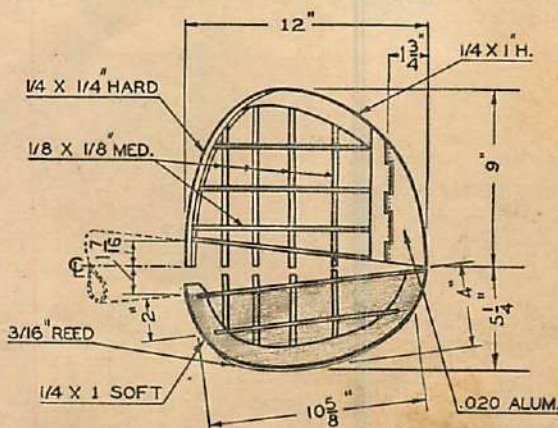
STABILIZER PLAN SHAPE IS LAID OUT THE SAME AS THE WING. SUBSTITUTE CHORD & SPAN IN FIGURE 2



BUILD IN 2 HALVES--INSERT SPAR-ENDS THRU HOLES IN FUSELAGE WITH CEMENT ON ENDS. CEMENT END RIBS TO SIDES OF FUSELAGE

FIG. 6 UPPER & LOWER RUDDER

UPPER RUDDER SHAPE IS LAID OUT SAME AS THE
WING FIG 2 LOWER RUDDER SHAPE GIVEN BELOW.



COVER WITH 1/16" SHEET AFTER ATTACHING TO FUSELAGE



CONTEST WINNER

A dependable ship with a three-year record, designed and built—

By HENRY STRUCK

Henry Struck and the model. Henry was among the first to use the fast power climb. His ships climb unusually fast and smoothly.



Since 1936 models of this design have been winning contests. Three of them were lost on out-of-sight flights during the outdoor fuselage event at the last national meet in Detroit. Unfortunately, in every case the model climbed so fast it disappeared from sight of the timers before it had clocked a truly long flight. Struck had to be content with a flight of 7:21 for 5th place. Had his models climbed a trifle slower, the official flights would have been longer and given him a well-deserved place nearer the top of the contest winners.

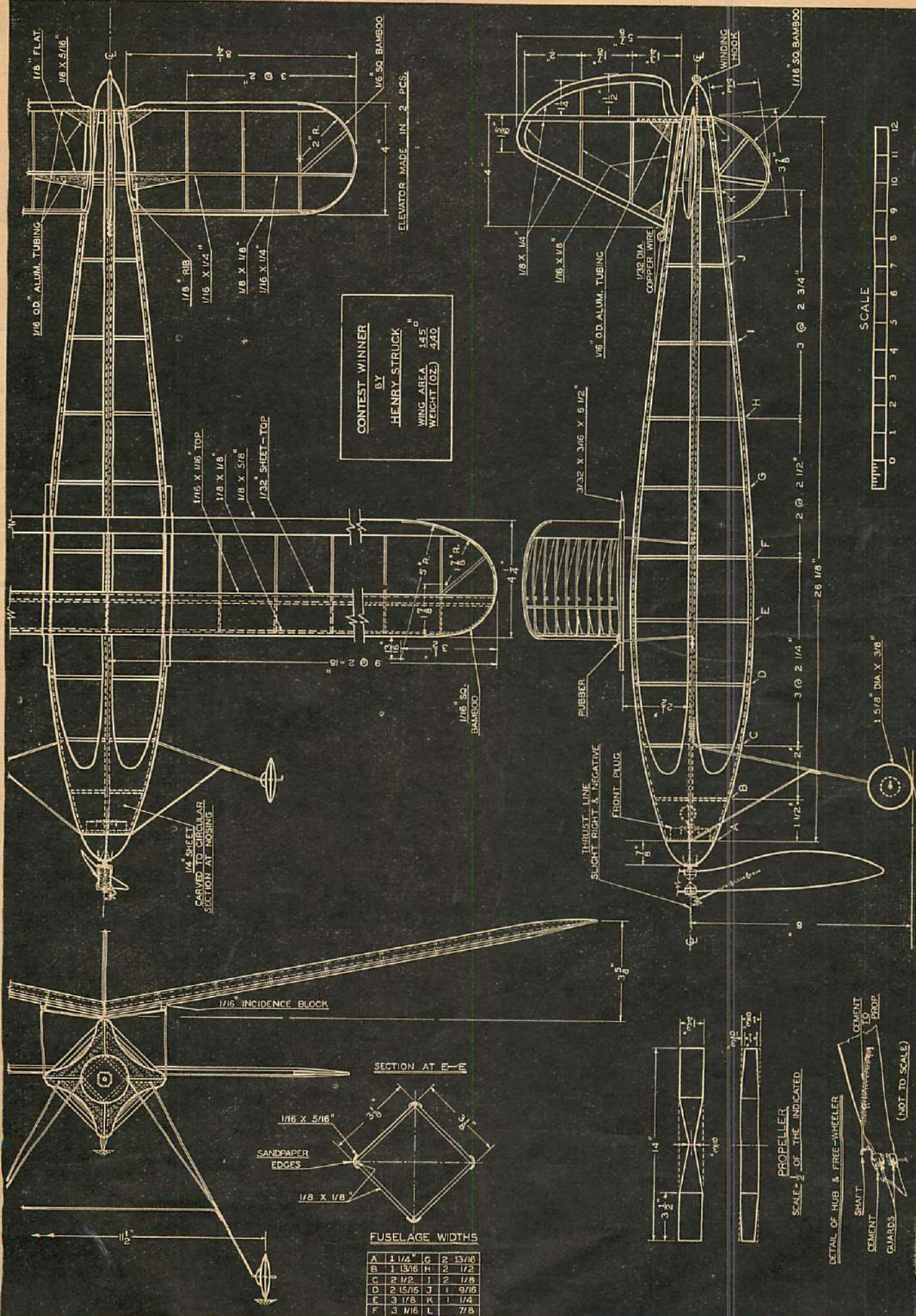
Any beginner watching Struck fly a model would certainly get a false impression of the skill necessary for a champion. Apparently without effort, he winds and launches the model. And on every flight the model climbs high into the sky following practically the same flight path. Since each flight is near the peak in efficiency, it takes only the slightest helpful thermal to carry the model out of sight.

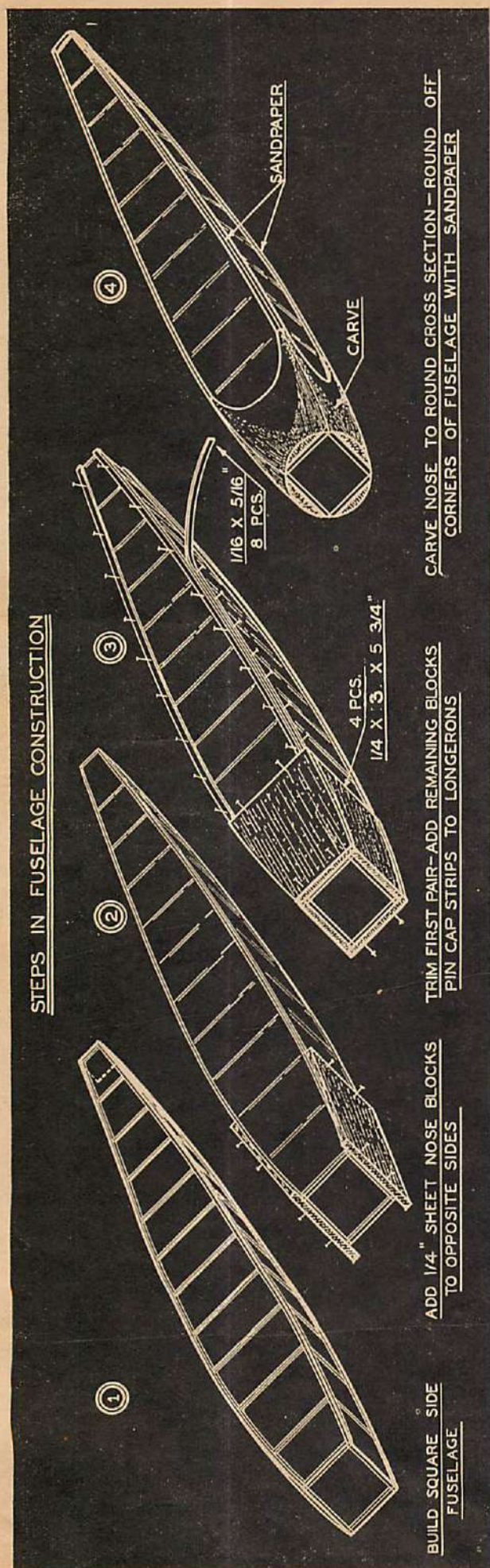
There's no magic touch behind Struck's sensational flying. He follows the formula of carefully adjusting a model until he's familiar with all its characteristics. Test flights show what the model is capable of doing. And it's a rare instance when a model fails to fulfill expectations during a contest session.

A model must be of sound design for repeatedly good flying. Struck holds that plenty of power and a fast climb are the most reliable way to long flights. He was one of the first to build models based on this idea. While other modelers were still working along the theory of long motor run, Struck was turning in long flights with fast-spinning, short-running propellers. This idea is now practically universal among contest modelers. However, Struck's models are still outstanding because of their ability to climb smooth and fast with a minimum loss of power.

CONSTRUCTION

Construction of the fuselage is the conventional square-sided, box-type set on edge for a diamond-shape cross-section. The widths of the fuselage at the stations A, B, C, etc., are tabulated on the three-view drawing. Steps in fuselage construction are shown on separate sketch. No. 1 shows the simple structure built up of $\frac{1}{8} \times \frac{1}{8}$ " balsa. First build two flat panels and join with cross-braces. No. 2 shows the same structure with $\frac{1}{4}$ " sheet balsa nose blocks added to the front of the fuselage. Carve the blocks to fit the curve of the fuselage. Pin in position while the cement dries. In No. 3 the first pair of nose blocks is trimmed and the remaining two blocks are pinned and cemented in place. $\frac{1}{16} \times \frac{5}{16}$ " cap strips are added to the outside edges of the longerons. In step





No. 4 the nose of the fuselage is carved to a circular cross-section. The corners of the fuselage are rounded off with sandpaper.

The front nose plug is circular to match the fuselage. The rear plug is square. Both plugs are cut to fit inside the fuselage a distance of $7/16"$. The rear hook (shown full-size in the drawing) is inserted through the rear plug and then bent in a loop to form a winding hook. Small, bent-prong, sheet-brass bearings are pressed and cemented into the inside and outside faces of the nose plug.

Landing gear is #14 wire. Joints are soldered and wrapped with very fine wire. The forward landing gear brace is bent from a single piece of wire. It is the shape of an inverted V with the bottom bent into a semi-circle which fits into a groove around the outside edge of the front of the fuselage at "A." The main landing gear struts are threaded and cemented to the longerons at "C." Wheels are $15/8"$ diameter hardwood with button-shaped pieces of hardwood backing up the inside of the wheels.

The wing mount is attached to the fuselage in the

About Henry Struck

Struck has spent half of his 21 years building models. His first was a model with kite-stick spars and a propeller carved out of a fruit-box end with linked rubber bands for power. After considerable testing Struck actually saw several inches of daylight between the wheels and the ground. Since then he has seen plenty of space between his models and the ground.

His first successful contest work was in 1934—a 1st place indoor flight of 9:10 with a Baby R.O.G. The next year he won his first outdoor contest at Lyndhurst, New Jersey. Later the same year he won the New York championship of the Junior Birdmen and a trip to the J.B. meet in Chicago. Continuing his contest sweep, in 1936 he won the J.B. eastern states indoor meet—R.O.G. and R.O.W.—and the stick event in the outdoor event. For the second consecutive year he was the New York champion and won a trip to the J.B. meet in Atlanta, placing second in point scoring. At this contest he won the cabin event with an out-of-sight flight of 12:14 with the type of model described in this article.

Last July in Detroit he competed in his first truly nationwide contest. And when the results were tabulated, Struck was 1st in the open class indoor cabin, 5th in the outdoor cabin, 8th in the indoor stick and 1st in the flying scale, which is certainly a bang-up contest performance!

Struck lives in Jackson Heights, a New York City suburb. He's a member of the Queens Aero Model Association. This club has done much to keep up interest in rubber-powered models. They recognize it as a sport, requiring just as much skill and ability as gas model flying.

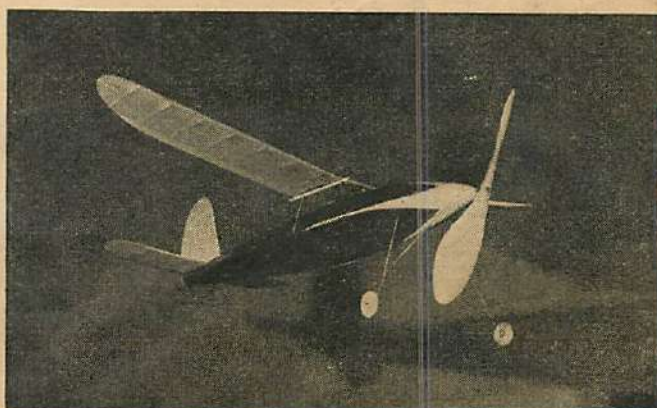
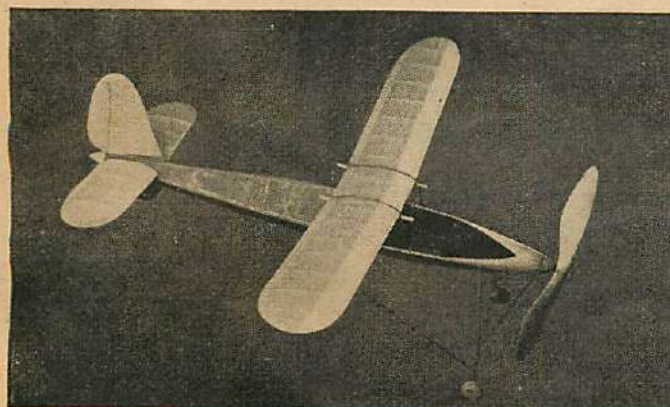
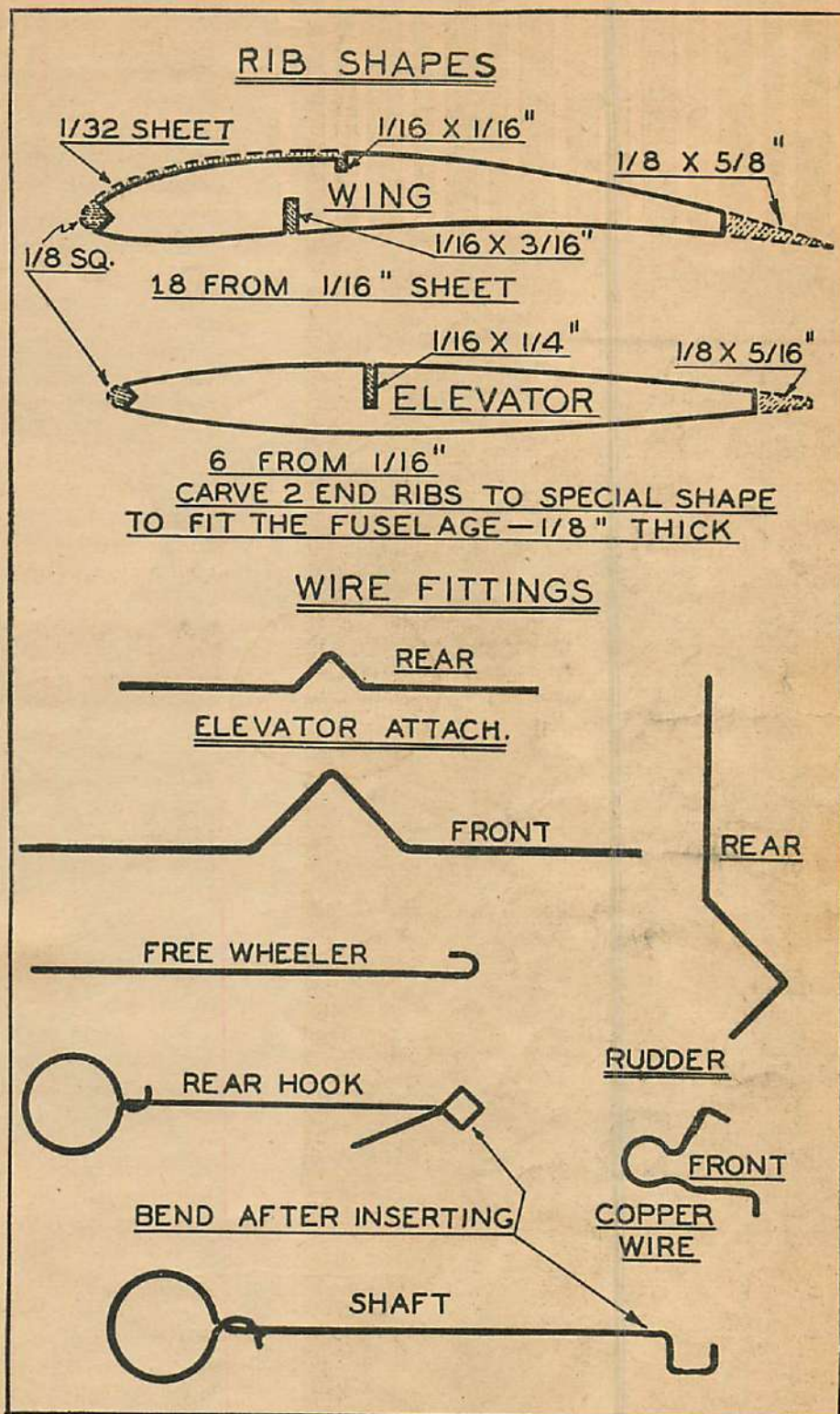
Struck is mighty capable when it comes to contest flying. Yet he hasn't lost that feeling that model flying is fun even if there are no prizes. Good flights are reward enough. Building a neater, more efficient flying model, and having plenty of fun doing it seems to be his idea. And no one can help but admire the efficient way he carries it out.

same way as the landing gear. Two pieces of balsa $\frac{3}{32} \times \frac{3}{16} \times 6\frac{1}{2}$ " attached to the top of the wire supports furnish the bearing surface for the wing. These pieces should be parallel to the center line of the fuselage— $2\frac{1}{2}$ " above at both front and rear. When the wing is resting flat atop the mount without any incidence blocks, the setting will be zero degrees.

The rudder is made as a separate piece. The method of attaching to the fuselage is the only unusual item. A $\frac{1}{32}$ " diameter copper wire fitting is cemented to the fuselage and to the leading edge of the rudder. By bending this fitting any desired rudder setting can be obtained. The rear of the rudder is attached by a piano wire fitting (cemented to the fuselage at "L") which fits into a piece of $\frac{1}{16}$ " outside diameter aluminum tubing which is recessed into the rear rudder spar. A drop of cement at the rear spar-fuselage junction will prevent the wire fitting from slipping out of the aluminum tubing. But do not cement the bottom rudder rib to the top edge of the fuselage! If you don't follow this precaution it will be impossible to change the rudder setting as intended by the soft copper wire front-fitting. (Turn to page 80)

Below, right—The salient features of the assembly are revealed in this interesting photo. The ship is similar to earlier Struck winners.

Below—Struck's model features the "diamond" type of fuselage. The design ideally combines performance, simplicity, and ruggedness.



HURRICANE

By WILLIAM WINTER

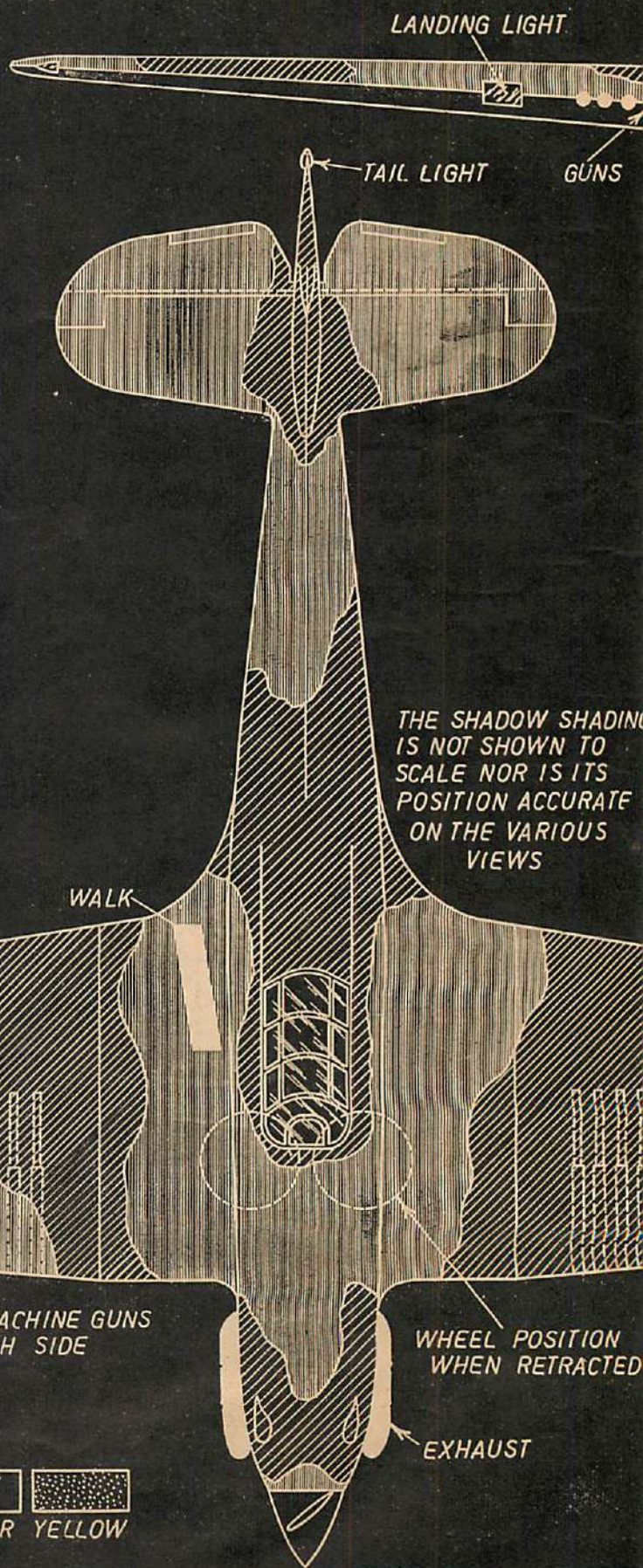
The Hawker Hurricane is undoubtedly the most publicized of all the world's fighting craft. The renown gained by the "hush-hush" Rolls-Royce Merlin as the first service 1,000 h.p. engine brought the first Hurricane to international attention. It must be borne in mind that this ship is designed for lightninglike interception only and cannot be compared accurately to any existing machine in this country.

A bill of materials follows these directions; refer to it for all material sizes.

Square down a soft block of balsa to the outside dimensions of the fuselage. On its largest size draw the profile of the body. After cutting away the excess balsa repeat the last two steps to reproduce the top-view shape. Round the edges in accordance with the cross-sections given and sand to a satin finish. The cockpit canopy can be made from a separate smaller block.

Mark the pattern of the tail surfaces on soft sheet balsa and cut out with a razor blade. Shape to a streamlined cross-section and sand. The stabilizer should be set in a notch cut in the fuselage. Plastic wood will complete the fillet.

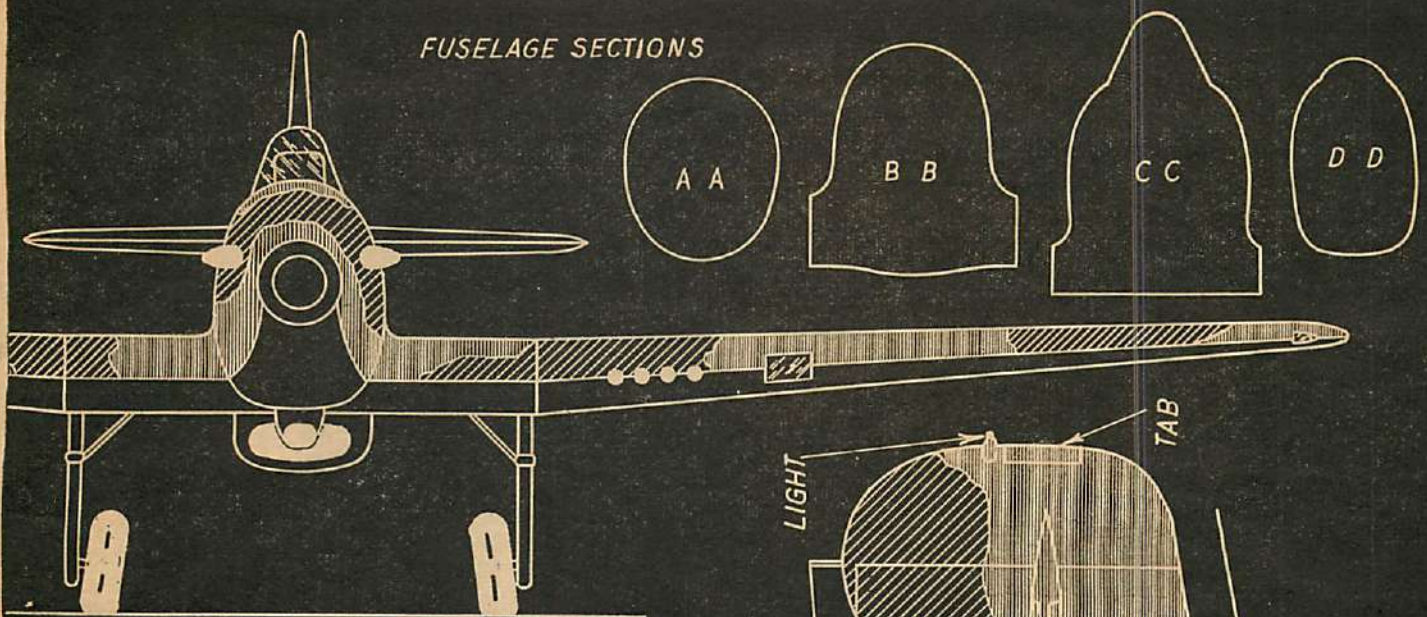
Make the wing in the same manner as the tail but shape to the proper airfoil section rather than just a streamline. The wing should be one piece set in a notch in the bottom of the fuselage. Crevices are not to be worried about; plastic wood fillets are to be added. For dihedral, cut a V-shaped notch in the upper surface of



COLOR SCHEME



FUSELAGE SECTIONS



the wing and crack the wood upward. Cement the crack and fill with plastic wood. Give the assembly a coat of clear varnish or shellac to fill the pores, and sand smooth with fine paper.

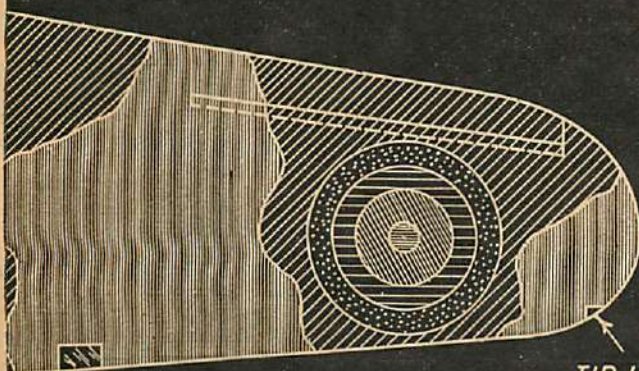
Attach the landing gear, belly radiator, tail wheel, exhausts and air scoop, making them all from scraps.

Paint the entire model green with a number of coats, with fine sandings after each. The brown patches are painted over the green. Rub the entire finish with an especially prepared marketed rubbing compound. Paint the canopy white, trim with black.

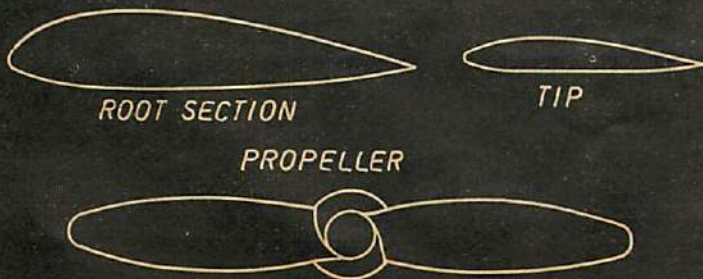
Make the propeller from scraps and mount on a pin, free to turn. Add the aerial.

BILL OF MATERIALS

- 1 block $1 \times 1\frac{1}{2} \times 7$ " fuselage
- 1 block $\frac{3}{8} \times 2\frac{1}{4} \times 10$ " wing
- 1 sheet $\frac{3}{16} \times 1\frac{3}{4} \times 12$ " tail surfaces
- 1 pair appx. $\frac{1}{2}$ " wheels
- 1 vial cement; clear dope, varnish, or shellac; scraps as required; green and brown enamel dope



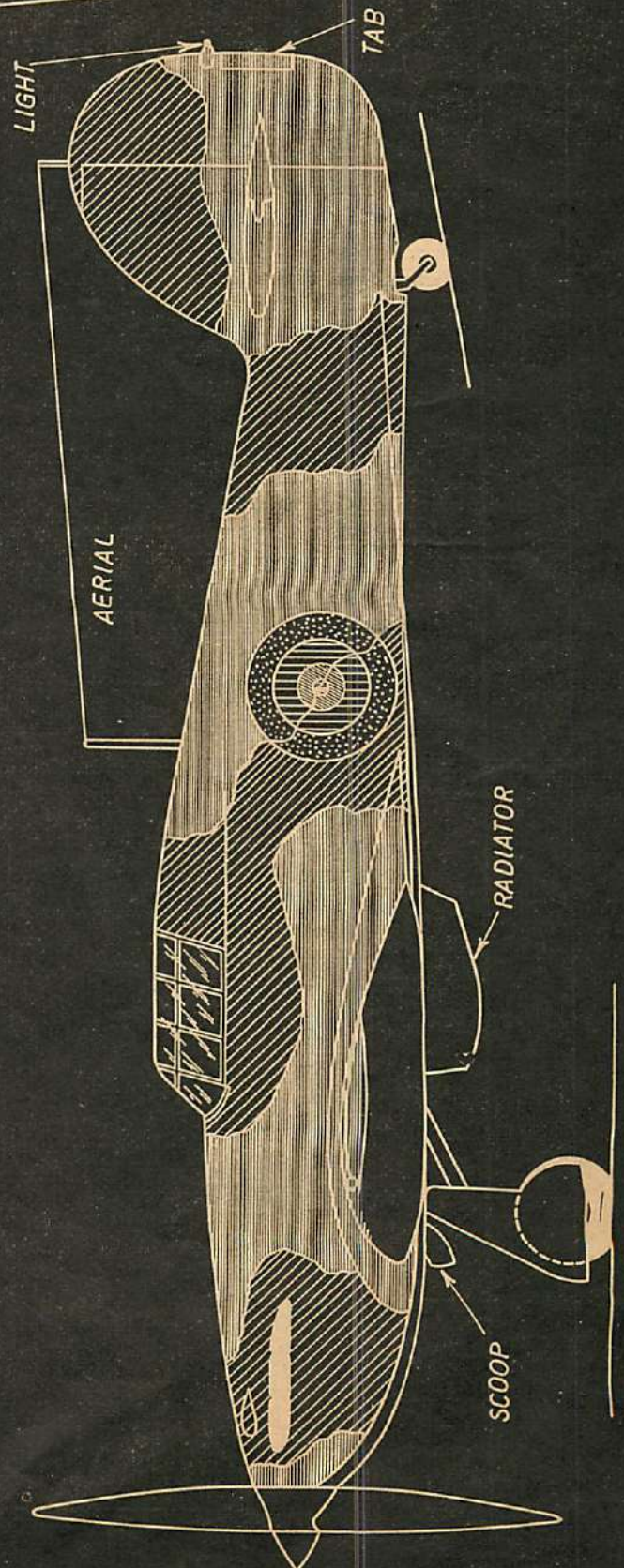
TIP LIGHT



ROOT SECTION

TIP

PROPELLER



PRO

The larger gas models have a great advantage over the small gas models. They have better soaring characteristics. I prefer to build a model around a $\frac{7}{8}$ " bore motor. It is more powerful and easier starting, making a more reliable set-up than one with a small $\frac{5}{8}$ " bore motor.—EDWARD LUTTER, Philadelphia, Pa.

The larger $\frac{7}{8}$ " bore motor is decidedly in top position over the $\frac{5}{8}$ " bore motor for contest work. The ratio of power to weight is in favor of the more reliable, powerful $\frac{7}{8}$ " bore motor. Larger gas jobs may be kept in sight longer, resulting in better official time.—EDWIN ELLIOTT, Sacramento, Cal.

I would much rather use a large model for contest work. They are inherently slower fliers with less damage resulting in the event of a crack-up, together with greater ease in adjusting. Stability and glide are also better on a larger model. A motor in the $\frac{7}{8}$ " bore class is more dependable than the smaller size. It starts easier and requires less servicing. By using a correspondingly large model, the utmost in performance can be obtained.—ROBERT PEIFER, Chicago, Ill.

For contest work I prefer a gas model of from 5 to $5\frac{1}{2}$ -foot span, powered with a $\frac{1}{5}$ or $\frac{1}{6}$ h.p. motor. A smaller model will not soar as well as this size job. The larger models do not display the fast climb of a well-powered 5-foot model. I think the $\frac{7}{8}$ " bore motor is better fitted for contest work. The smaller motor does not have the power to perform well in a gas model of sufficient size to soar well.—JACK SELBY, Elyria, O.

I think that the combination of a larger model and the $\frac{7}{8}$ " bore motor, other conditions being equal, is unbeatable for all-around, top-notch performance. The larger ship is likely to be more efficient. Recent advances in model engineering theory and practice indicate that short chord rib sections tend to lose much of the efficiency accredited to the same sections in real plane usage. In fact, there seems to be a loss in aerodynamical efficiency whenever a smaller unit is used rather than a larger one. Propellers demonstrate that adequately. It is acknowledged from experience that very small propellers exhibit a definite loss in performance. Larger ships, too, are more stable and are more easily trimmed and kept in trim. A host of large jobs such as the Valkyrie and Cavalier substantiate this. It will be noticed that no smaller ship evidences equal stability.—R. M. WOOD, St. Louis, Mo.

CON

I like a small gas job with about a 6-foot span. Its climb is steep, which more than compensates for its slightly less efficient glide. The $\frac{7}{8}$ " bore motors are my choice, as they are less delicate and more reliable than the smaller series.—RICHARD DUNBAR, Shelton, Wash.

Small models offer an advantage over larger rivals. They have a faster climb. The best arrangement is to use a $\frac{7}{8}$ " bore motor in a small model. The excess power will give the model several hundred feet additional altitude over the larger model equipped with the same power.—WARREN VREELAND, Pittsfield, Mass.

I prefer to build my gas model around a $\frac{5}{8}$ " bore motor. The only type of gas model contest held in California is the precision type, thus putting both large and small models alike on an even footing. The construction cost of a small model is not prohibitive and transportation problems are less difficult.—LYMAN ANDERSON, Huntington Park, Cal.

For contest work I prefer a model with an area of from 6 to 8 square feet because it is easier to get the minimum loading permitted. A smaller model has a higher wing loading because the engine, batteries, etc., make up such a large portion of the total weight. On large models the weight of the structure is too great. The correct size can't be found until the type of event in which it is to be entered and the exact h.p. and complete weight of the engine is known. I prefer a $\frac{7}{8}$ " bore to a $\frac{5}{8}$ " bore engine because the larger engine has

more power per weight.—JERRY ULRICH, St. Cloud, Minn.

The smaller ship and engine are my choice. Modern contest rules predicate that a ship be a fast climber. Inasmuch as the small ship climbs steeply and more tightly, considerable altitude can be gained during the limited motor run. Needless to say, the smaller ship is easier to build, less expensive, and can be lost with less heartbreak. I feel that the smaller motor is ideal. The little ship powered by a $\frac{5}{8}$ " bore motor is the rage. The large bore motors are used, mainly, because the first engine happened to be a $\frac{7}{8}$ " bore.—JOE DUGAN, Chicago, Ill.

THE DISCUSSION CORNER

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

THIS MONTH'S TOPIC: In designing and constructing a gas model to be entered in contest events, do you believe that the larger gas models offer an advantage over their smaller rivals? Which would you prefer, a $\frac{7}{8}$ " or $\frac{5}{8}$ " bore motor?

NEXT MONTH'S TOPIC: Responsibility of youngsters in gas flying.

FOR DECEMBER: What is the chief objection to the contest rules as they were followed during the early season? Should the 30-second motor run for gas models be continued, extended, or reduced? Answers must reach us by September 20th.

FOR JANUARY: Do contestants object to paying a non-returnable entry fee with the understanding it will be used to help defray the expenses of the meet? What should be the limits of the fee, \$.25 or \$.50? Answers must reach us by October 20th.

HANG GLIDER

(Continued from page 25)

around. To my surprise, I could not even feel that the controls were hooked up, it worked so freely. I asked Bob if he was sure all the controls were hooked up. He laughed and said, "Sure, that is the way I designed it, so you cannot feel any control pressure and your body will be free to move quickly for controlling in the air." This control stick at your back slides through an eyelet on your control harness, and gives direction to the glider according to how you move your body. I was all set to go, so I grabbed hold of the two bicycle handle-grips on the framework.

Bob said, "Now, Don, lean far forward when you run to get the tail up off the ground." (When you lean forward the elevators drop down and raise the tail up.)

I started running as fast as I could and leaning forward as far as possible. I immediately felt the tail leave the ground and did not have any trouble balancing the wings. When I came to the edge of the hill, I leaned back as far as I dared, and *Wow!* she shot off the ground and zoomed up to about fifteen feet. I leveled out and at the same time put my feet up on the stirrups and started gliding. I heard Bob yelling, "Boy, oh, boy, look at her go!"

I'm telling you, I have had many thrills in my glider activities but this tops them all. You actually run right off into space! Upon leveling out I found I was gliding swell, but leaning a little to the right. The ship was rigged a little off. I glided over the main boulevard and toward another field on the other side. As I was coming in to land at about ten feet, I started to take my feet off the stirrups to land on my feet as Bob had instructed, but thought I had better land on the wheel and tail skid, as I was coming in too fast. As I leaned back to level off, to my surprise she zoomed up again. I had been flying with too much speed. This glider has a skyhook wing section and can fly very slow. I gradually glided closer to the ground and kept leaning back farther and farther until I had the stick all the way back and she made a perfect two-point landing. I even kept the wings level until she was completely stopped. I had glided about 1100 feet.

I suggested to Bob he put on a small rudder, connected to the ailerons, before attempting to fly off any really high hills. It was all right for small hills, when you only glide into the wind for a few hundred feet, but when you start going off the top of a mountain or high hill you want more control. That was all I found wrong with this glider.

The wind by this time dropped down and we could not fly any more, since we

NATIONAL CONTEST WINNER AND WORLD'S FINEST GAS MODEL, THE Comet "CLIPPER"

The sensation of the Nationals, won more places including 1st than all other kits combined. Flown and designed by Carl Goldberg, world's foremost model builder. Build a real winner that flies like a whiz—climbs over 600 ft. on 30 second motor run. Win contests and enjoy real gas model flying with this plane.



Model has wingspan of 6 ft. and weighs 2¼ lbs. with engine. Fits N.A.A. rules. Kit is complete with Timer to adjust motor run, has wheels, tapered spars, shaped leading edges, removable motor cowl, all paper and dope and a motor mount to fit any motor and many other features. The most complete kit on the market.....

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WITH AIR WHEELS....\$6.50

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Brown Jr. "D".....	\$10.00	Mighty Midget.....	\$ 9.50
Dennymite Airflow.....	15.85	Gwin.....	12.00
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Brown Jr. "B".....	21.50	Forster.....	17.75

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All guaranteed to be in perfect running order, all overhauled and worn parts replaced. Coils and Spark Plugs in good condition. Because we have the country's largest trade-in and repair dept. we can give these values. If there is any special used motor you want that is not listed, write us and we may have it.

Mighty Midget.....	\$5.00	Brown "B".....	\$12.00
G.H.Q.....	4.00	Brat (used 2 hrs.).....	12.00
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Brown "C".....	9.00	Ohlsson.....	8.00
Brown "D".....	7.00	Trojan.....	10.00

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"Premier Model Airplane Showrooms of America—
1939 WORLD'S FAIR"

could not run fast enough to get off. We took it down to the Redondo glider field, where I made a car tow in it.

After I had climbed in down at the field, the tow line was connected to the release. I put my feet on the stirrups and gave the signal for the car to start. The release broke in two, so I took the tow line in my right hand and said, "Let's go!" The car started again and I immediately climbed to fifty feet and there wasn't over thirty pounds' pull on the line. I let go of the line and glided all the way down the hill, almost to the road, about 1500 feet. Upon taking my vest control harness off I noticed

both aileron wires were off the pulleys and the ailerons were frozen solid in the neutral position, which proved the glider was designed perfectly. I had used my shifting weight as lateral control.

A specification list on the "Toboggan-air" hang glider may be of interest. Here it is:

Span.....	20 ft.
Chord.....	4½ ft.
Area.....	160 sq. ft.
Length.....	15 ft.
Height.....	7½ ft.
Weight.....	120 lbs.
Take-off Speed.....	15 m.p.h.
Useful Load.....	200 lbs.

THE VALKYRIE

(Continued from page 71)

two intermediate points. Movement of the tab should preferably be stiff to hold any desired setting.

$\frac{1}{16}$ " sheet balsa covering is added to the lower rudder. $\frac{3}{16}$ " diameter reed is countersunk halfway into the lower outside edge to protect the balsa from wear. The upper rudder is covered with bamboo tissue.

Directional stability of the model was good despite the reduction in rudder area to about 6%. And the small, well-shaped rudder did much to improve the appearance of the model.

FINISHING

The attractiveness of the model depends on the time and attention given to finishing. The balsa skin of the fuselage should be doped and then rubbed smooth with sandpaper, the procedure being repeated until glossy smooth. Fillets should be carefully shaped and then finished to match the fuselage. Any irregularities in the surface should be filled with sawdust and cement or a similar mixture.

FLYING ADJUSTMENTS

A summary of adjustments includes the following items. Zero-zero setting

of the thrust line. No offset thrust of any amount was used. Center of gravity at a point 45% or 9" back from the leading edge of the wing. Wing incidence was 2°. This setting is referred to the center line of the fuselage (thrust line) and is measured by raising the leading edge $\frac{5}{8}$ " above the trailing edge. A straight edge, held across the bottom surface of the wing, is taken as the chord line. (The wing being at zero incidence when the straight edge is horizontal or parallel to the center line of the fuselage.) Elevator incidence is $\frac{1}{2}$ ° negative incidence. Measure the angle in the same way as that of the wing. $\frac{1}{2}$ ° negative is equivalent to lowering the leading edge $\frac{1}{8}$ " below the trailing edge.

Unfortunately, there was no Valkyrie entered in the recent national meet in Detroit. Goldberg didn't have time to build a duplicate of the original Valkyrie which was lost in Canada last year. The original model was loaded 5.85 ounces per square foot. This could readily have been raised to 8 ounces to meet this year's requirements without any decrease in flying and soaring characteristics.

Goldberg graciously credits fellow-modelers for their help and advice in

completing the enormous task of designing and building the Valkyrie. Thanks go to Sidney Axelrod, Bill Gough, Len Elgenson, Gerald Ritzenthaler, Leon Klesman, Pete Vacco, and others in the Chicago group.

MATERIAL REQUIRED

(Balsa unless otherwise noted)

Wing

- 48 pcs. $\frac{1}{8}$ x $\frac{1}{8}$ x36", spars (very hard)
- 40 pcs. $\frac{1}{8}$ x $\frac{1}{8}$ x36", bracing (soft)
- 4 pcs. $\frac{5}{16}$ x $\frac{1}{4}$ x36", trailing edge (very hard)
- 4 pcs. $\frac{3}{8}$ x $\frac{3}{8}$ x36", leading edge (very hard)
- 1 pc. $\frac{3}{16}$ " dia.x24" reed, tips
- 12 pcs. $\frac{1}{16}$ x2x24", tips and center covering (medium)
- 8 pcs. $\frac{1}{8}$ x2x36", ribs (medium)

Wing Mount

- 20 pcs. $\frac{1}{8}$ x2x4", wing platform (very hard)
- 1 pc. $\frac{1}{4}$ x1x20", backbone (hard)
- 4 pcs. $\frac{1}{16}$ x2x12", covering (medium)
- 1 pc. $\frac{1}{4}$ x1x5", trailing edge (hard)
- 1 pc. $\frac{1}{4}$ x $\frac{1}{4}$ x5", leading edge (hard)
- 8 pcs. $\frac{1}{8}$ x $\frac{1}{8}$ x6", spars (medium)
- 1 pc. $\frac{1}{8}$ x1x10", ribs (medium)
- 1 pc. $\frac{1}{16}$ " diam.x12" wire, hooks

soft balsa blocks for fillets.

(Turn to page 82)

CONTEST WINNER

(Continued from page 75)

The elevator is made in two pieces. The section is symmetrically cambered, top and bottom. Note that the end rib on each half of the elevator is cut to fit snug against the side of the fuselage which curves in two directions at this point. Elevator attachment is much the same as the rudder except that two wire-and-tube connections are used for each half. The front fitting is cemented across the fuselage just aft of "K". The rear fitting is grooved into the rear of the fuselage at "L"—in much the same way as the front landing gear support was attached. Additional strength is obtained by cementing the edge ribs to the sides of the fuselage.

The lower rudder serves as a tail skid. The ends of the bent bamboo are inserted into the bottom longeron and cemented. $\frac{1}{8}$ x $\frac{1}{8}$ " braces, tapered in thickness where they contact the bamboo, are added for additional strength.

Wing construction is conventional throughout. The forward-top portions of the ribs are notched to receive the $\frac{1}{2}$ " sheet balsa covering. The wing is made in two halves and joined by butt-joining the spars, leading and trailing edges, and the two end ribs of each half of the wing. $\frac{1}{32}$ " sheet balsa is added

to the top leading edge. The front edge of the sheet balsa is cemented to the leading edge and is sanded to round out the shape of the rib. The rear edge of the balsa is cemented to the top spar ($\frac{1}{16}$ x $\frac{1}{16}$ ").

The propeller is carved from a block $1\frac{3}{8}$ x $1\frac{3}{4}$ x14" shaped as indicated in the three-view drawing. The blades are cut and then shaped by rounding off the tips and cutting away part of the rear of the hub. The propeller blades are given considerable camber—about $\frac{3}{16}$ " beginning near the center and extending well out toward the tips. Metal guards are bent to fit over the front and rear of the hub to hold the shaft in position and prevent wear.

The freewheeling is one of the simplest though most effective methods yet devised. It is the work of Louis Garami, a neighbor of Struck and a veteran modeler whose enthusiasm and ability have done much to spread the model doctrine throughout the neighborhood. The freewheeling consists of a single hooked-end length of piano wire. It is anchored in the propeller blade with cement and two small wire staples driven into the blade. The end of the propeller shaft is bent to a U-shape. To engage the freewheel-

ing, the hook in the end of the wire attached to the propeller blade catches the shaft at the bottom of the U. When reversing the action, the shaft slips out of the hook and is free to revolve.

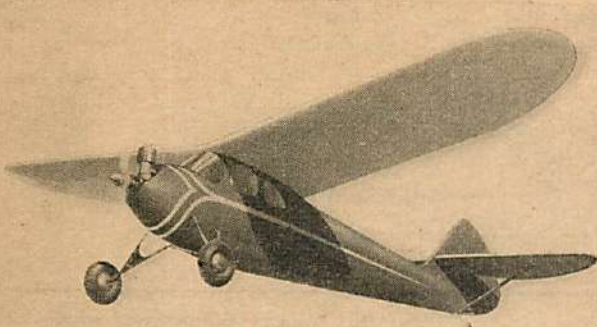
Power is supplied by 12 strands of $\frac{1}{4}$ " flat brown rubber. There is no slack in the rubber—which is tight between the rear hook and the propeller shaft.

Covering is outdoor tissue. Spray with water to stretch the tissue after covering. Treat the tissue with one or more coats of light dope. All exposed wood parts are carefully doped and sanded until smooth.

FLYING

First check the balance of the model and the incidence of the surfaces. The model should balance in a normal flight attitude when supported on the fingertips at the diagonal wing-tip braces. Rest the wing flat atop the mount for preliminary flying. The elevator should be at a negative angle of about 3 degrees. (Raise the trailing edge about $\frac{1}{8}$ " above the leading edge.) Now try a hand-glide in a grassy field where the landings will be soft. Correct any diving tendency by inserting small slivers of balsa under the leading edge of the wing until a long glide is obtained. These adjustments are not final, as constant minor changes are made during tests. However, they do serve (Turn to page 82)

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Wingspan 44". Length 32". Flying Weight with Motor 17 ozs.

Finest small gas model in existence. 1/3 of building time of large models. Kit is 100% complete including M & M pneumatic wheels; 10" semi-finished prop; ribs, bulkheads, fairings, etc., printed on balsa; tail wheel; battery box, etc.; liquids; full size plans for building and flying the Eaglet. On test flights flown successfully with Brat and Trojan engines.

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\$3.95
POSTPAID or at Dealer
Including M & M Pneumatic Rubber Wheels



THE STREAMLINER

Wingspan 6 ft.; Weight (less motor) 2 1/4 lbs.; Length 43". An advanced type of gas model ready to build from the most complete kit on the market.

Complete kit less wheels... **\$4.95**
Complete with 3 1/2" pneumatic wheels..... **\$5.95**



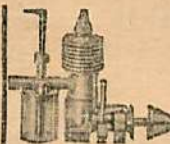
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6 ft. Wing—56" long
2 1/2 lbs. (less motor)
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The FLEA

36" Wingspan Length 28"
Weight 4 ozs.
Gas Type Rubber-Powered Model Airplane
James Clark of Akron, Ohio, flew his Flea model to a record distance of 10,000 feet (over 2 miles). Kit is 100% complete, including a pair of M & M wheels.
Only **\$1.95** Postpaid



BRAT ENGINE
3 1/2" High, 1 1/2" Bore, 1 1/2" Stroke, 1/10 H.P. Postpaid **\$16.50**



TROJAN JR.
3 1/2" High, 1 1/2" Bore, 1 1/2" Stroke, 1/10 H.P. Light Weight, Powerful. Postpaid **\$18.50**

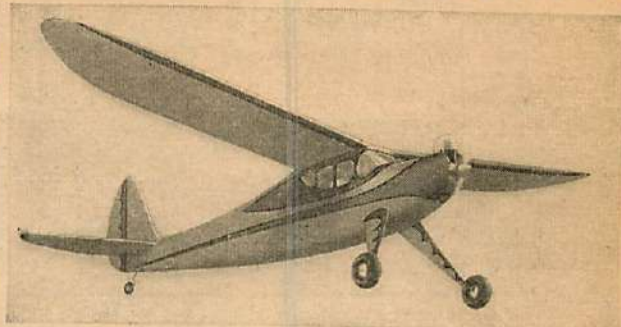


M&M MOTOR
Bore 2 1/2"/32"
Stroke 2 1/2"/32"
Weight 3 1/2" ozs.
A motor with power, stamina, and long enduring performance.
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OTHER SMALL ENGINES

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Pee Wee... 14.50
Condor... 18.50
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Ohlsson Jr. 16.50

Engines are complete, ready to run, including coil, spark plug, oil and instructions.

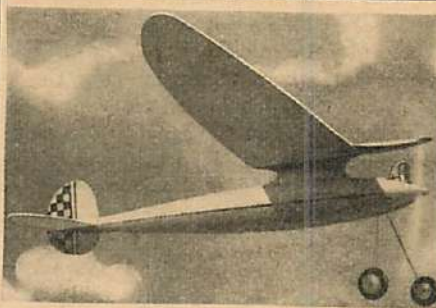


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Wingspan 36" Length 28" Weight 4 ozs.

The kit is complete, including M & M pneumatic wheels with inflating tube; all formers printed on balsa; tri-pitch 10" balsa washers; tissue; motor hooks; cement; and all necessary metal drawings with explicit instructions. A real value for only **\$1.95**!! Order your kit now!

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THE VALKYRIE

Gas type Rubber powered model airplane
Wingspan 24"
Weight 1 1/2 oz.

This model is a miniature duplicate of an actual contest winning gas model. Designed by Indoor Champion Carl Goldberg.

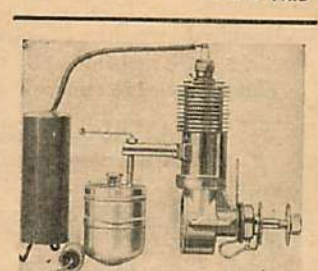
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Used for teaching fundamentals of aerodynamics in New York University, Y.M.C.A. and numerous summer camps all over the U.S. Quickly assembled. Flies 300 to 500 ft.

25c POSTPAID



BROWN Jr. ENGINE-D \$10

High quality metals, alloy steel cylinder with aluminum piston and 2 special rings, forced connecting rod, simplified pin type control, and other high quality features.

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DE LUXE MODEL. Aluminum outside exhaust, dural mounts, etc., **\$17.85**.

STANDARD MODEL. As illustrated, plus hot spark coil and condenser, **\$15.85**.

UNIT ONLY. Less coil and condenser, **\$13.85**.

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7 ft. DeLuxe gas model. This kit is absolutely complete, including 3 1/2" Pneumatic wheels and finest quality materials. Has won over 100 first and second prizes at contests.
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20" Wingspan with Bridge-Type Landing Gear and Full Size True Scale Drawings

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Scientific Gas Model Finishes



Clear Nitrate Dope, Colored Nitrate Dope, Nitrate Thinner, Gas Model Cement, Regular Cement, Bamboo Paper Cement, Bamboo Oil.
1 oz. bottle... **\$1.10**
2 oz. bottle... **.15**
3 oz. bottle... **.25**
1/2 pt. can... **.50**
1 pt. can... **.75**
1 qt. can... **1.40**

TRU-PITCH GAS MODEL PROPELLERS
13"x11", ca. .75
15"x10", ca. .95

BAMBOO PAPER

24x36
White, ea. ... **.07**
3 for ... **.20**
Yellow or red, each ... **.10**

"ZEPHYR" SILK

Grade A Silk, 36" wide, yard ... **.50**

M & M PNEUMATIC WHEELS

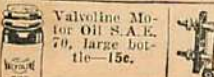
1 1/2" pair **.50**
1 3/4" pair **.50**
1 1/2" pair **.50**
1 3/4" pair **.50**
1 1/2" pair **.60**
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No. 1 1 1/2" long—20c
No. 2 1 1/4" long—20c
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Valvline Motor Oil S.A.E. 70, large bottle—15c.



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1" dia. pr. **.15**
1 1/4" dia. pr. **.18**
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Scientific Pneumatic Rubber Wheels

3 1/2"



Funnel with filter screen—30c

VALKYRIE

(Continued from page 80)

Stabilizer

- 2 pcs. $\frac{1}{4} \times 1 \times 24''$, trailing edge (very hard)
- 2 pcs. $\frac{1}{4} \times 1 \times 24''$, leading edge (very hard)
- 8 pcs. $\frac{1}{8} \times 1 \times 24''$, spars (hard)
- 5 pcs. $\frac{1}{8} \times 1 \frac{1}{2} \times 12''$, ribs (medium)

- 1 pc. $\frac{3}{16}''$ dia. $\times 18''$ reed, tip outline
- 3 pcs. $\frac{1}{8} \times 2 \times 12''$, covering (medium)
- 10 pcs. $\frac{1}{8} \times 1 \times 12''$, rib bracing (soft)

Rudder

- 1 pc. $\frac{1}{4} \times 1 \times 12''$, leading edge (hard)
- 2 pcs. $\frac{1}{4} \times 1 \times 8''$, trailing edge (hard)
- 4 pcs. $\frac{1}{8} \times 1 \times 12''$, spars (medium)
- 1 pc. $\frac{1}{8} \times 1 \times 18''$, ribs (medium)
- 1 pc. $\frac{1}{4} \times 1 \times 18''$, lower rudder outline (soft)

- 1 pc. .020 $\times 2 \times 6 \frac{1}{2}''$ half-hard aluminum, tab
- 4 pcs. $\frac{1}{16} \times 2 \times 12''$, covering (medium)
- 1 pc. $\frac{1}{32}''$ dia. $\times 8''$ piano wire, tab hinge
- 1 pc. $\frac{3}{32}''$ dia. $\times 12''$ reed, bottom rudder outline

Additional Items

- 12 sheets heavy bamboo tissue
- dope, thinner, cement

CONTEST WINNER

(Continued from page 80)

the useful purpose of preventing crack-ups under power.

Warping the wing is a necessary part of adjustment to offset the torque of the propeller. Viewed from the front, the left leading edge of the wing is warped up about $\frac{3}{16}''$. The leading edge is warped from the center—where its shape is unchanged—reaching a maximum near the tip of $\frac{3}{16}''$. The right leading edge is warped down about $\frac{3}{32}''$ in the same manner. The leading edge of the rudder should be offset about $\frac{1}{8}''$ to the right (viewed from the front) for an against-torque circle.

Power flights should be made first with a limited number of winds—50 to 100 turns. Circles should be to the right during both power and glide. On successive flights when increasing the number of turns it will probably be necessary to add a little down-thrust to prevent stalling. And possibly right thrust will be necessary to hold the right circle. Make these adjustments in the thrust line by inserting small balsa slivers between the nose plug and the front of the fuselage.

A good glide should always be the first consideration when making adjustments. It should be as flat as possible, near the stall but still not mushing. For windy-weather soaring, a very slight stall and a sharper circle are excellent. Otherwise a steady glide and 40-to-50-foot circle are the best. Once the glide is obtained to your satisfaction make final adjustments for the power flight.

In the climb the size of circle is not so important as long as the maximum altitude is attained. Slight stalls in fairly large circles may be eliminated by a lit-

tle right thrust if the glide is good. Under full winds the first part of the flight is almost vertical with a slight lean to the left with the torque. The circle gradually tightens to the right as the motor runs out.

Do not use slack that may bunch up in the rear of the fuselage, thus shifting the center of gravity and ruining your carefully adjusted glide. A 35-to-40-second power run is all that is necessary to get ample altitude. And since a slack rubber motor has less power than a tight one, the ultimate altitude in both cases is practically the same. 750 winds can be jammed into the 12 well-lubricated strands of $\frac{1}{4}''$ flat rubber.

WEIGHTS AND DATA

Wing65 ounces
Tail20
Fuselage	1.45
Propeller and plug70
Rubber	1.25
Tail plug15

Total..... 4.40 ounces

Required weight (3 ounces per 100 square inches)—4.35 ounces.

Wing area—145 square inches.

MATERIAL REQUIRED

(Balsa unless otherwise noted)

Fuselage

- 4 pcs. $\frac{1}{8} \times 1 \times 26 \frac{1}{2}''$, longerons
- 8 pcs. $\frac{1}{8} \times 1 \times 12''$, braces
- 8 pcs. $\frac{1}{16} \times 5 \times 20 \frac{1}{2}''$, cap strips
- 4 pcs. $\frac{1}{4} \times 3 \times 5 \frac{3}{4}''$, front nose blocks
- 1 pc. $1 \frac{1}{16} \times 1 \frac{3}{4} \times 1 \frac{3}{4}''$, front nose plug
- 1 pc. $1 \frac{1}{8} \times 1 \frac{1}{8} \times 1 \frac{5}{8}''$, tail plug
- 2 pcs. $\frac{3}{32} \times 3 \times 16 \times 6 \frac{1}{2}''$, wing mount
- 2 pcs. #14 dia. $\times 24''$ piano wire, wing mount, landing gear

- 1 pr. $1 \frac{5}{8}''$ dia. $\times \frac{3}{8}''$ hardwood wheels
- 1 pc. $\frac{1}{16}''$ dia. $\times 12''$ piano wire, shaft, rear hook and freewheeling
- 1 small pc. sheet brass, prop guards, nosing bearings
- 1 pc. $1 \frac{3}{8} \times 1 \frac{3}{4} \times 1 \frac{1}{4}''$, prop block

Wing

- 2 pcs. $\frac{1}{8} \times 1 \times 16 \frac{1}{2}''$, leading edge
- 2 pcs. $\frac{1}{8} \times 5 \times 16 \frac{1}{2}''$, trailing edge
- 2 pcs. $\frac{1}{16} \times 1 \times 16 \times 18''$, top spar
- 2 pcs. $\frac{1}{16} \times 3 \times 16 \times 18''$, bottom spar
- 2 pcs. $\frac{1}{16} \times 1 \times 16 \times 12''$, bamboo, tip
- 5 pcs. $\frac{1}{16} \times 1 \times 2 \times 14''$, ribs
- 2 pcs. $\frac{3}{32} \times 1 \frac{1}{2} \times 18''$, sheet covering

Elevator

- 2 pcs. $\frac{1}{8} \times 1 \times 8 \times 7''$, leading edge
- 2 pcs. $\frac{1}{8} \times 5 \times 16 \times 7 \frac{1}{4}''$, trailing edge
- 2 pcs. $\frac{1}{16} \times 1 \times 4 \times 8''$, spar
- 2 pcs. $\frac{1}{16} \times 1 \times 16 \times 6 \frac{1}{2}''$ bamboo, tips
- 1 pc. $\frac{1}{8} \times 1 \times 2 \times 6''$, bracing
- 2 pcs. $\frac{1}{8} \times 9 \times 16 \times 3 \frac{1}{2}''$, end ribs
- 3 pcs. $\frac{1}{16} \times 3 \times 8 \times 7''$, ribs
- 1 pc. $\frac{1}{32}''$ dia. $\times 12''$ piano wire, attachment fittings
- 4 pcs. $\frac{1}{16}''$ O.D. aluminum tubing $\times 1 \frac{1}{4}''$, attachment

Rudder

- 2 pcs. $\frac{1}{8} \times 1 \times 4 \times 6''$, leading edge and spar
- 1 pc. $\frac{1}{16} \times 1 \times 8 \times 12''$, ribs
- 1 pc. $\frac{1}{8} \times 1 \times 2 \times 8''$, trailing edge
- 1 pc. $\frac{1}{8} \times 5 \times 1 \times 1 \frac{1}{2}''$, corner angles
- 1 pc. $\frac{1}{16}''$ O.D. aluminum tubing $\times 1 \frac{1}{4}''$, attachment
- 1 pc. $\frac{1}{32}''$ dia. $\times 2''$ soft copper wire, front fitting
- 1 pc. #14 dia. $\times 3''$ piano wire, rear fitting
- 1 pc. $\frac{1}{16} \times 1 \times 16 \times 6''$ bamboo, lower rudder outline
- 2 pcs. $\frac{1}{8} \times 1 \times 8 \times 2''$, braces

Additional Items

- 3 sheets outdoor tissue, $20 \times 24''$
- 2 ounces dope and cement

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GLIDING

(Continued from page 33)

July 7. Weather unfavorable for soaring activities. Peter Riedel, on his second try, made a goal flight of 73 miles to Syracuse, N. Y., with Milton Gorton of the B.A.C. as passenger.

July 8. Riedel, carrying Carl Lange, flew 103 miles to Utica, N. Y., Decker 108 miles to Oriskany, N. Y., Alfred Bayer, with Mrs. Bayer as passenger, 97 miles to Deansboro, N. Y., Lehecka 53 miles to Homer, N. Y., duPont 42 miles to Groton, N. Y. Lieutenant Colonel R. E. Olds, who led the Flying Fortresses on a flight to South America, flew up in a B-18 Bomber to watch the soaring. Other visitors at Harris Hill were General and Mrs. Boetticher of the German Embassy and Jack Gray, engineer for the B.A.C.

July 9. No distance flights were made on this day. Lehecka landed at East Athens, Pa., gaining 3720 feet altitude. C. B. Colby, editor of Air Trails, E. L. Robbins, also connected with the magazine, and F. Darius Benham flew up from New York City in a Stinson piloted by Lieutenant Chester Cross. That evening the Air Trails party was held for the officials of the meet. Present were Lewin Barringer, Earl Southee, Arthur Lawrence, Kenneth Dodd, Lieutenant Colonel R. E. Olds, Lieutenant Pendham and others.

July 10. The last day of the contest. All those making distance flights had to have their recording barographs in at the barograph room by 7 p. m. so that distances and altitudes could be computed in time for giving out of prizes at the annual banquet to be held that evening at the Mark Twain Hotel. Decker flew 78 miles to Wilkes-Barre, Pa., Lehecka 74 miles goal flight to Scranton, Pa., Riedel 74 miles to Scranton, Pa., Floyd Sweet 51 miles to Binghamton, N. Y. Merboth reached an altitude of 5290 feet over Harris Hill.

BANQUET AND AWARDS

William McGrath, president of the Elmira Area Soaring Association, officially opened the annual banquet. Speeches were made by Mayor Beers of Elmira, General Boetticher, George Crandall, Captain Hanson, Lieutenant Colonel R. E. Olds, who described the flight of the Fortresses to South America, and Mrs. Warren Eaton, who announced that the winner of the Warren Eaton Memorial Trophy will be named later in the year. After the speeches the awarding of the prizes took place, as follows:

A. Felix duPont Altitude Trophies. Gold trophy and \$1,000 cash to Richard C. duPont, 6,700 feet above take-off. (American record). Silver trophy to

Robert Stanley, 6380 feet. Bronze trophy to Peter Riedel, 6360 feet.

Bendix Glider Trophy. Gold trophy and \$500 cash to Peter Riedel for his flight of 225 miles to Washington. Silver trophy to Stanley Corcoran, 202 miles to Cecil, N. J. Bronze trophy to Chester Decker, 173 miles to Nova, Md.

Cross & Benham Duration Trophy. Benrus watch to Stanley Corcoran, 7 hours, 25 minutes.

Edward S. Evans American Soaring Championship Trophy. To Emil A. Lehecka, holder of the highest number of points among American pilots.

Air Trails Trophy. To Robert Stanley for the record-breaking altitude obtained on his first qualifying flight for a "C" license. Lieutenant Cross presented the trophy to Jay Buxton as a proxy, since Stanley, a flying cadet in the Navy, had to return to duty on board the U.S.S. Lexington before the end of the contest.

Eastern Air Lines Prize. Round trip for two, New York to Miami, to Peter Riedel, holder of the highest number of points.

Governor Earle of Pennsylvania Trophy. Gold cigarette case with the Commonwealth of Pennsylvania seal, to Peter Riedel, the first pilot to land at Harrisburg, Pa.

Edward S. Evans Barograph Awards. To Warren Merboth and Stanley Corcoran.

Fairchild Trophy. To Warren Merboth and Julian Hadley, holders of the highest number of points accumulated by one ship.

Prize of the Institute of Aeronautical Science. Pocket barograph, to Ted Belak for his report on a soaring flight on July 8.

Fiduciary Council Prize of \$1000. To Peter Riedel for his flight to Washington, D. C.

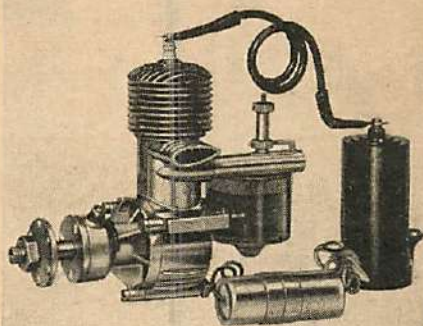
Transcontinental & Western Air Prize. Round trip for two, New York to Chicago, to Emil A. Lehecka, holder of the second highest number of points.

SILVER "C" WINNERS

Seven pilots gained their Silver "C"'s at this year's contest. They are: Warren Merboth, Glen Rock, N. J., Robert Stanley, San Diego, Cal., Ted Belak, Newark, N. J., Stan Corcoran, Hollywood, Cal., Julian Hadley, Englewood, N. J., Robert Auburn, Buffalo, N. Y., Floyd Sweet, Elmira, N. Y.

Three pilots fulfilled part of the requirements for the Golden "C", which demand the possession of a Silver "C", a distance flight of 186.4 miles, and an altitude of at least 9840 feet. Silver "C" holders Peter Riedel, with 225 miles, Robert Stanley, with 219, and Stanley Corcoran, with 202, now lack only the altitude requirement to gain the highest award in soaring.

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AER-O-KITS (SHEFFIELD), Hanover Works, 135 Scotland St., Sheffield 3, England; BOND'S O'EUSTON ROAD, LTD., 357 Euston Road, London N. W. 1; MODEL AIRCRAFT STORES, 127b Hankinson Rd., Bournemouth, England; R. STAB, 35 Rue des Petit Champs, Paris, France; ESKADER, Narvapatset, Gumshornsgatan 8-9, Stockholm, Sweden; HONOLULU PAPER CO., Honolulu, T. H.; MODERN AIRCRAFT (PTY.) LTD., P. O. Box 1906, Cape Town, South Africa.

(OHLSSON)
MINIATURES

630 NORTH ALVARADO STREET
LOS ANGELES, CALIFORNIA

N.A.A. NEWS

(Continued from page 27)

which emergency service was provided include the N.A.A. Cadets Power Model Air Meet in Los Angeles last year, and both the 1936 and 1937 National Aircraft and Boat Show.

In addition to these occasions, the Aerial Nurses have proved their special value in many individual cases. Physicians have utilized their services on both brief hops to give medical attention to sick and injured persons in isolated places, and on cross-country flights in attendance upon critical cases destined for famous specialists and clinics.

Some idea of the professional qualifications demanded of the active member in the Aerial Nurse Corps can be gained by a brief look at the training program of the organization. A member must volunteer for a three-year enlistment period. During this training period she must devote one night each week to the study of medicine and aeronautics. The lectures and lesson materials are devoted to the particular problems involved in transporting sick and injured persons by air and the nursing technique dictated thereby.

With a large nationwide membership of nurses so equipped, the country should benefit tremendously.

NEW INTERNATIONAL RECORD FOR U. S.

Amid the cheers of several thousand persons at Shushan Airport in New Orleans, Clarence R. McArthur on June 28 piloted the low-wing racing monoplane *Flash* to a new international 100-kilometer (62 miles) closed circuit speed record of 227.027 miles per hour for single-seater light land planes powered with an engine having a cylinder displacement of between 397 and 549 cubic inches. The previous record was 206.131 m.p.h. and was held by Maurice Arnoux of France.

The record, officially established over the measured 100-kilometer course between New Orleans and Reserve, La., was timed by Charles S. Logsdon of N.A.A. Headquarters and two assistants, and is subject to official homologation by the Federation Aeronautique Internationale, world-governing body for sporting aviation, with headquarters at Paris. The N.A.A. is the American representative of the F.A.I.

PRIVATE FLYING ADVANCES

It seems as if private flying in the United States is definitely due for better times. The Bureau of Air Commerce has recently taken the important step of establishing a private flying section. And now the N.A.A. is happy to announce that an agreement of affiliation has been made between our organization and the Private Flyers Association. Each of the

two groups will, of course, retain its own identity, but are affiliating for the common good of each other and for aviation.

The purposes of the Private Flyers Association are "to make private flying more convenient, less expensive and more enjoyable by sponsoring the private flyer's viewpoint in such matters as governmental regulations and legislation, insurance and flying facilities; by providing him with useful information on the charges at airports, conditions of fields and cross-country courses; and by representing him in all other matters and problems which involve his interests."

The P.F.A. has had an admirable record in accomplishing these ends. Of the several special organizations interested in private flying, the P.F.A. has been most vocal recently in its views on government regulation of private flying, and for that reason probably has had a major share in centering the Bureau's attention on the need for a private flying section. And this brings out an important point regarding private flying's future. If a new and happier era is opening, we can be sure that private flyers themselves must play a major role in bringing it about.

According to a recent survey by *Aviation*, 2,050 aircraft were sold for sport and business use during the past year. Of this number, the surprising total of 1,542 were in the light plane class.

But the most important yardstick of the private pilot's place is given by airport statistics. Of the 2,299 airports throughout the United States only a handful are principally airline terminals. Intermediate fields along the airways account for but 283. Eighty-seven are military or naval bases. The impressive number remaining are the operating stands for the country's fixed bases and private owner flyers!

Although it is not fair to make a comparison by number of planes operating, it is a fact that there are over 6,000 planes engaged in private and miscellaneous flying as against only 386 airlines in air transport service. In any event there is little doubt of the importance and scope of private flying in the air picture.

As for the N.A.A., private flying with its members and leaders has long been a major interest; and there has been a growing recognition in the Association of the desirability of specialized organization within N.A.A. to further private flying needs.

From the governmental viewpoint, the new private flying section of the Bureau of Air Commerce should prove a boon to private flyers and aid materially in coordinating the problems of non-air line operations with air line flying.

As everyone knows, this is a real problem in itself. Many private flyers feel that the air lines have taken over the airways. The air line pilots will tell you

that the next time one of their number comes upon a private flyer making an instrument approach near an airport and not following instructions from the tower, don't blame them for really getting tough.

The new private flying section should do much to bring to the attention of the air line personnel the fact that there is a strong private flying group with a real interest in aviation. And the new section, working through other sections of the Bureau, should fill a need in developing sound private flying regulations.

The plans of the new section indicate that aside from the broad field of encouragement and regulation of private flying, the section is going to concern itself with the special problems of individual groups. Consideration will be given to the problems of water flying. Gliding and model flying will be encouraged. Manufacturing activities in the small plane field will be studied with a view to increasing the quality and the sales of the product. Development work will continue to receive encouragement, and further economies in construction and operation will be studied. It is indicated that the chief of the section in charge of such activity will be a private pilot with broad experience and background. In addition, leaders in private flying will be invited to serve on an Advisory Committee which will help by lending constructive advice.

All of which points to the value and desirability for the early development of a comprehensive national program for the development of private flying. Of one thing, at least, we can be sure—success in achievement of such a program will be in direct ratio to how well private owner pilots and those interested in private flying organize themselves.

WORK OF N.A.A. CHAPTERS

A question not infrequently asked by those unfamiliar with N.A.A. work is, Just what do your chapters do?

Among the varied activities undertaken, the following are three examples: the sponsoring of an air tour, the sponsoring of a model airplane group, and assisting in the establishing of a local airport.

Witness the Second Louisiana N.A.A. Air Tour, held in April of this year, which was an outstanding success. Starting with a ball at Shreveport, the tour got off to a lively start. Stops were made at many of the principal cities in the state where excellent entertainment was provided, including dinner dances, banquets, breakfasts, luncheons, and miscellaneous activities. One novel feature was at Lafayette, where the many stags on the tour were presented with baby dolls, each conveniently labeled with the name and address of a Lafayette girl who was willing to date an aviator.

Altogether, 45 ships participated and much was done to stimulate interest in flying in the cities and towns visited.

Youth training is one of the most important activities that can be undertaken by a chapter, and many have accomplished admirable results. To encourage the young people of Akron, Ohio, in their interest in aviation, the Akron Women's Chapter of N.A.A. has sponsored since 1934 the Edith Van Orman Junior Chapter in which youngsters may construct model airplanes and learn the science of aeronautics under competent guidance. Four contests, two indoor and two outdoor, are held each year. Four city-wide meetings are also held yearly, featuring programs both entertaining and instructive. The Akron Women's Chapter pays all expenses incidental to these activities and, in addition, sends city winners and a contest director to the National Championship Model Airplane Meet. At this year's meet a prize was given to the most active girl contestant.

Many N.A.A. chapters have been the prime movers in establishing airports for their communities. The Tampa Chapter was a leader in securing for that city the modern Peter O. Knight Airport and the \$100,000 Tony Janus Memorial Administration Building. Janus is said to have inaugurated the first commercial air line in the world when, in 1914, he lifted a Benoist flying boat from the water at St. Petersburg and twenty minutes later landed at Tampa, the first flight of a twice-daily round trip service.

The port itself provides facilities for both land planes and seaplanes, and is believed to be one of the finest of its kind in the United States. It cost the Federal government about \$500,000, most of which was secured from the WPA.

These are but a few of the activities of N.A.A. Chapters, many others of which could be cited. These local units, widely distributed geographically, are doing much toward making and keeping America first in the air—by the general furtherance of air knowledge and air progress in their communities, through gatherings where non-flyers are brought together with those directly connected with the industry, through youth training and forward-looking projects of all kinds.

COLLEGE FLYERS MAKE FINE DISPLAY

Campus pilots had their annual field day when the National Intercollegiate Flying Club held its 1938 meet at Akron, Ohio, from June 25 to June 27. Eight colleges participated, all but one of which scored.

Kenyon University and Leland Stanford University were tied for top honors, each with 14 points. Detroit was second with 12, while Michigan chalked up 8.

So far as individual pilots were con-

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ROOSEVELT AVIATION SCHOOL
AT ROOSEVELT FIELD, MINEOLA, L. I., N. Y.

cerned, C. Henderson was high man with 10 points. Henderson is the new president of the N.I.F.C. Running him a close second was L. Zygmunt of Detroit U., with 9 points. G. Brink, hailing from Michigan, had 8, while R. H. Williams of Leland Stanford came through with 7.

No. 1 Event, 360 degree Spot Landing, was won by Leland Stanford; No. 2, bombing, by Leland Stanford also; No. 3, Navigation Cruise, by Detroit; No. 4, Bull's-eye Landing, by Kenyon; and No. 5, Paper Strafing, by Kenyon.

The scoring system used was 5 points for first place; 3 for second, 2 for third, and 1 for fourth.

Major Fred L. Smith, Chief of the Airport Traffic Control Section of the Bureau of Air Commerce, acted as chief judge, representing N.A.A.

MEMBERS OF N.A.A. EXECUTIVE COMMITTEE

Colonel J. Carroll Cone. One of the best-known figures in aviation, Colonel Cone is now serving with distinction as the Manager of the Atlantic Division of Pan-American Airways. Cone will be well remembered as the capable former Assistant Director of the Bureau of Air Commerce in charge of air regulation. He was the executive secretary of the Federal Aviation Commission during the comprehensive study made by that body of aeronautics here and abroad.

The colonel is no armchair, broomstick pilot, having served as a pursuit pilot at the front during the World War, where he accounted for several enemy planes. Altogether, he has pushed the throttle for something like ten thousand hours. Following the war, he organized the Arkansas National Guard Air Corps,

became its commanding officer and was director for aeronautics in that state.

Arthur S. Dudley. Dudley is Secretary-Manager of the Sacramento Chamber of Commerce. Long prominent in aeronautical activities, Dudley has acquitted himself in fine fashion in such important posts as executive secretary of the Interstate Airways Committee; as the energetic chairman of the Joint Committee on Air Defense; as chairman of the Western Aviation Conference; and as chairman of the National Air Frontier Defense Association.

Dudley is dedicated to the advancement of aeronautics and when his name heads an organization, as it has done so many times in the past, you can be sure that he has laid plans—and will carry them out—that would floor anyone with less energy.

Colonel Floyd E. Evans. Colonel Evans is State Director for Aeronautics for Michigan. To mention but a few of his other honors, he is president of the National Association of State Aviation Officials and N.A.A. Governor for Michigan, as well as a member of N.A.A.'s executive committee.

Evans entered military aviation during the World War, serving as an observation pilot on the Western Front, and commanding the 88th Aero Squadron. He was awarded the French Croix de Guerre for exceptional gallantry in action while performing a daring mission over Chateau-Thierry.

When the big scrap was over, he returned to Michigan where he organized, and for five years commanded, the National Guard Air Corps. Now he is Division Air Officer. Evans is also a member of the National Aviation Committee of the American Legion.

QUESTIONS

(Continued from page 36)

two engines and in that way utilize the slipstream of the propellers for lateral control. The Cessna company may be reached at Wichita, Kansas, and the Howard firm at 5310 West 65th Street, Chicago. The Seversky is supposed to do 325 top, and since we have no figures on the Curtiss with an Allison motor, it is impossible to make any comparisons. I believe, however, that the Curtiss would be considerably faster.

Question: What are the top speeds of the Vickers Wellesley and the A. W. Whitley? Who in your opinion has the most efficient air force in the world? What is the difference between first-line and reserve planes? L. A., Windsor, Ontario.

Answer: The Wellesley does 171 at

sea level and 226 at 19,000 feet. The Whitley does about 215 m.p.h. I have no way of judging the efficiency of any air force, and so can't answer your second question. My opinion would only be a personal one, and one very hard to prove. First-line planes mean those of the absolute latest type in squadron service. Reserve ships are those becoming obsolete, but still suitable for emergency war duty, but yet too far advanced for primary or secondary training work.

Question: I hope to become an airplane mechanic, but owing to my finances I cannot purchase training. Could I enlist in the Army and get Army training without taking flying training? F. C., Baltimore, Md.

Answer: If you enlist in the Army Air Corps, and are selected for training as a mechanic, you will possibly be called upon to do some flying, but not

as a pilot. Mechanics often have to go into the air for special engine tests, or make up part of the crew of bombers.

Question: What is the top speed of the Hurricane? Why don't they put retractable pontoons on racing seaplanes to cut down air resistance? How fast was Howard Hughes' transcontinental racer? A. F. E., California.

Answer: According to official British figures the Hurricane does 360 m.p.h. Since the Schneider Cup trophy race ended some years ago, there has been no real incentive for speed seaplane racing. The excessive cost of racing seaplanes and the training of speed pilots to fly them is far beyond the reach of the average airplane builder, and the actual financial returns, even after victory or a new speed record, are never very high. The actual top speed of Howard Hughes' racer was 352 m.p.h. His cross-continent time was 7 hours, 28 minutes.

AIR ADVENTURERS

(Continued from page 35)

for the United States can certainly use a good aero Diesel.

Ralph Oyler, aged 28, of Laureldale, Pa., is back in the model building game after getting his private license. He does not say why he has given up flying, but we sincerely hope he gets back into it soon.

James Beranek, Jr., of Mt. Pleasant, Pa., sends us a shot of Al Williams' Gulfhawk which was in England doing a special stunting show. He's wild about our Air Progress magazine and is out trying to get more members.

A Photography Award has been forwarded to Richard Jesson, Jr., of Cuyahoga Falls, O., for a neat shot of an Aeronca LA-70 taken at the Akron Airport. He used a 120 Kodak Verichrome film and Velox paper. He says the light conditions were good, and the picture shows it.

Another new member is Tom Galarneault, Jr., of St. Cloud, Minn. Tom has been taking instruction in a Cub owned by a relative of his. He is also active in the model building game and is particularly keen about our articles in Air Adventurers.

Jack Cashman of Sheridan, Manitoba, is one of our most loyal readers. He was very keen about the article on the Ryan Flying School and hopes we can publish more like it. He does a lot of model building from our plans and thinks we print some of the most interesting features on light planes. Well, we certainly try hard, Jack, and we do like to get a complimentary letter now and then.

Some of the photographs that have appeared in this department have been

envied by Eugene Sommerich of St. Louis, and he would like to obtain copies of two that appeared lately. We can't sell these pictures, Eugene, as they do not belong to us and we usually mail them back to the owners as soon as they are published. You may get good airplane photos from Rudy Arnold Photos, Floyd Bennett Airport, Brooklyn, N. Y.

A member who is already a Topographer and an Airplane Mechanic has just passed his Photographer's test with a grand picture of a Taylor Cub taken with a Kodak Bullet camera on V127 Kodak film. R. D. Thayer of Athol, Mass., is the persistent chap. He has now sent in for his Flight-Lieutenant's test paper.

Another "Bill" Barnes, really Willard S. Barnes of Syracuse, has shot us in two neat pictures of Frank Fuller's Seversky racer taken at the Syracuse Municipal Airport. Barnes is a rare "raver" on the Seversky and believes it to be the finest pursuit plane in the Army Air Corps.

Al Kennedy of Omaha, Neb., sent us a fine drawing of a pursuit ship of his own design by air mail recently, along with many others who also helped celebrate Air Mail Week. Al states that his "dream ship" is powered with an Allison engine and does about 400 m.p.h.

Another new Photographer is Jack Maloney of St. Thomas, Ontario, who sends us a picture of an autogiro taken up his way. Jack also gives much interesting detail on the ship and explains that he used a 2A Brownie.

And this is the end of the month's general news. We want more good draw-

ings and more Observer stuff and more entries for the Topographer's awards. So come through, you Air Adventurers. This is your corner, you know.

FLIGHT CAPTAIN

Herman McBroom, Dallas, Texas

FLIGHT LIEUTENANTS

George Hammond, Montreal, Que., Can.
Marge Silverthorn, Lafayette, Ind.
Fred Clark, Wellington, B. C., Canada
Norman Dawber, Toronto, Ont., Can.
Henry Triwush, Chicago, Ill.
Warren Vreeland, Pittsfield, Mass.

AIRPLANE MECHANICS

Don Smith, Dillon, Montana
Henry Silhan, New York City
B. E. Bewell, Victoria, B. C., Can.
R. Henders, Toronto, Ont., Can.
Joseph Edward Howe, Boston, Mass.
Howard Smeltzer, Greensburg, Pa.
Thomas Clohosey, East Orange, N. J.

PHOTOGRAPHERS

Bob Alexander, Vancouver, B. C., Can.
Carl Sharpe, Hollywood, California
Harold Lorimer, Brockville, Ont., Can.
Robt. Prichard, Jersey City, N. J.

TOPOGRAPHER

Cliff Carter, Victoria, B. C., Canada
Bob Jacobs, Walkerville, Ont., Canada

OBSERVERS

Alan B. Thayer, R.F.D., Petersham Rd., Athol, Mass.

ENGINE MECHANIC

Lloyd G. Lewis, Verdun, Que., Canada

LIGHT PLANES

(Continued from page 29)

and see what he says. When you reach the five-hundred-hour mark there's nothing anyone can tell you about flying. You do cross-wind landings, you take off sloppy and you are just flying on dumb brute strength because you have tossed away all they taught you in flying school. That's when you are ripe for trouble. Bang!"

"What happens then?"

"Well, if you live through it, you're a lucky guy and usually the crash has knocked some sense back into you. You look about and try to figure what happened and if you have a good pal on the field who saw what happened he'll tell you, and you go home and get down on your knees and swear you'll never do it again."

So beware the five-hundred-hour jinx, you young pilots. It takes quite a time to get there, and you should be good by then, but it might also be a good idea to get your sincerest critic to give you a check flight now and then and let you know how bad you have become in that time.

NEWS AND NOTES

R. B. Street of Hamilton, Ontario, tells me that the new Knight Twister is now for sale at something like \$1,200 F.A.F. Chicago, and that Vernon W. Payne will send you an illustrated folder on the ship if you send him a stamp. I might also add for Mr. Street's information that I was referring to the first Knight Twister when I said that it cost more than three times the price of a Cub. By that I meant, of course, that a single experimental job always costs a great deal more than ships that come straight from a production line.

The British Miles people, who have turned out some pretty smart light planes, have now added a Rolls-Royce engine to an improved trainer so that it does 270 m.p.h. at 10,000 feet; which is one of the reasons London writers have been putting up such a squawk about the Air Ministry's purchase of 150 North American trainers, which only do 171.

The American Cub, now so popular abroad, sells, according to British advertisers, at "something under \$2,500," which gives you some idea what it costs to fly over there and sometimes makes us wonder how they can maintain so many flying clubs. As another comparison, a Miles Hawk with a Cirrus III engine, which has been flown for 450 hours, can be bought for \$1,375.

Several readers have made pointed suggestions that our National Air Races should do more toward catering to the

light-plane fan and give him a chance to get into the fun on a handicap basis. For years I have been stressing this point. I hate to continually bring up the fact that they seem to do this sort of thing very well on the other side. The recent Isle of Man air race saw sixteen entries and the race took place in a pouring rain, and yet a Gipsy Comper with an average speed of 159.5 m.p.h. won, while a Mew Gull flown at 230 m.p.h. was tied for fifth with a B.F.W. Me108 which averaged 191.5 m.p.h. The results, of course, were decided on a very fair system of handicapping.

Surely something like this can be done over here.

The Aeronca KCA now fitted with the Continental A-50 engine is winning a lot of friends and should soon be as popular as the Cub and Taylorcraft. As a matter of fact all three appear so much alike that it takes weeks for the uninitiated to tell them apart. Of course the Aeronca has added wheel spats which gives it a particularly racy appearance.

The new steerable tail wheels available now for fitting to Cubs, Porterfields, Rearwins, Taylorcrafts and Aeroncas, appear to us to be just the thing. They are being put out by the Aircraft Associates, Inc., of Long Beach, California, and cost about \$25. A good tail wheel may prevent many of our ground-loop accidents.

If you have a one-way radio set in your plane and would like to make a two-way set out of it, you should write to the Western Electric Co., 195 Broadway, N. Y., for their new "Midget" equipment which enables you to "talk back" on any frequency from 2,800 to 6,400 kc. It is well worth your interest.

With all the widespread advertising Waco is doing at present on their tri-cycle landing gear and "sedan type" airplane, we should soon see the sky lanes cluttered with Waco N's. However, we can't ignore the many laudatory statements that come from those who have flown the "three-wheeler." They tell me you simply can't ground-loop her.

In another section you will find a new list of flying clubs, about 113 all told. I was amazed when I had collected that list to learn there were so many. The Editor has kindly consented to publish the list in the hope that many of our readers who are continually bombarding us for details on clubs in their particular area will settle down and get in touch with the various secretaries and find out what it costs to join. I wish that any club not included would send in details so that they may be added the next time this list is presented.

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THE CHARGER GOES TO SYDNEY

(Continued from page 56)

"If we don't see 'em soon we might as well save our gas and coast in!"

"We won't start any coasting until we're right over the tape," replied Bill.

"Look, Bill, look," yelled Sandy, "down there by that wispy cloud with the dark edges! See 'em, Bill? It's the Breguet, the French team. That's one down and one to go!"

Sandy continued to scan the air about them, then the sea and clouds below, searching for the remaining entry, Slade.

As the minutes raced he became more and more intent but did not relay to Bill the fear that gripped his young heart that they might even now at the end of so gallant a race be beaten by the one man who would give anything or do anything to bring about the defeat and failure of Bill Barnes.

The city of Sydney danced to life twenty miles in front of them and Bill eased the nose of the Charger down to put her in a long diving power glide to the finish.

A queer choking sound reached Bill through the intercockpit phone. He whirled to glance into the rear cockpit. "Great Scott, fellah, what's the matter?" Bill snapped into his phone.

"I don't see Slade anywhere, not anywhere," mumbled Sandy, unaware that Bill had been watching him. "If he's there first I'll kill him with my own hands, the——"

Bill's relieved howl through the phone interrupted him, and he stared at the back of Bill's head in amazement.

"I wasn't sure then," continued the familiar voice in his helmet receivers,

"and I still don't know what became of the Rapier, but now I know I was right—the pilot of that last green ship we just missed colliding with was Slade. He must have——"

But Sandy didn't even listen to the rest as the walls of his cockpit misted and blurred through tears of sheer exhaustion and relief.

They were only a thousand feet above the city, traveling at a terrific speed, but the roar of saluting harbor guns reached up to engulf them even above the thunderous song of the twin Diesels.

Bill eased on his throttles and settled back into his bucket seat. His face was drawn and lined with weariness, but a grin cracked his lips as "What's all the shooting for?" came in a startled voice through the receivers.

"It means," said Bill, a ring of pride in his tired voice, "that the Charger goes to Sydney—first!"

THE CHARGER

(Continued from page 48)

Emerging from the gangway, I found myself in the pilot's cockpit. This compartment occupies the nose of the fuselage and projects well beyond the propeller line. It is entirely glazed about the seat line and permits a degree of visibility unsurpassed in any fighter I have ever seen. Sandy was already ensconced in the pilot's seat, eager to demonstrate the equipment. I noticed that the instrument installation is similar to that in the rear pit.

Beneath the bank of engine instruments on either side of the pilot's seat are mounted a pair of fixed .50 Browning machine guns. These are within easy reach of the pilot in case of jams. The guns are fitted with large ammunition reels and may be loaded from the cockpit or through exterior panels. Clearly visible ammunition counters are incorporated in the gun feed. In fact, the whole gun installation is similar to that on the Lancer excepting only the absence of synchronizing gear. After displaying the machine guns, Sandy cranked the pilot's seat forward, reached around behind it and lifted a trap door in the floor. Fitted snugly within the triangular section of the belly, there rests the breech mechanism of a sleek, long-barrel automatic cannon. All these guns are aimed through a single telescopic sight mounted above the radio panel. This sight is adjustable and is fitted with lenses which eliminate glare.

Emerging at last from the rear cockpit, we climbed out on the wing. A mechanic had unfastened the panels covering the port engine and I squatted down alongside Sandy to take a look. The kid explained that Bill Barnes had abandoned his old V-type Diesel as it is

not adapted to the kind of wing mounting desired in his new ship. The famous flyer contracted with a well-known German firm of Diesel engine manufacturers to obtain a pair of their newly developed high-performance powerplants.

I finally managed to boil down his lecture to these points. The Barnes Charger is powered with two "pancake" Diesel engines mounted entirely within the thickness of the wing stub. They are six-cylinder, horizontal, compression-ignition motors of the opposed-piston, two-stroke type. They burn fuel oil injected into the combustion chambers under heavy pressure. This fuel, similar to that regularly used in the Barnes ships, is inflammable only at very high temperatures and practically eliminates fire hazard. The absence of spark plugs, magnetos, etc., does away with the principal source of static and is responsible for the high degree of radio efficiency characteristic of the Barnes fleet. The engines develop a normal output of 1,800 h.p. at 2,550 r.p.m. at 15,000 feet.

Descending to the ground, we made a circuit of the gleaming plane while Sandy pointed out features we had missed on our inside tour. A side panel to just aft of the gunner's cockpit swung open to display the emergency equipment carried by all of Bill Barnes' planes. There is the rubber boat with its lightweight oars and a tank of compressed air for inflating it. Packed inside the boat is a tiny outboard motor together with extra fuel, iron rations of food and water. A tool kit, including a dural shovel, combination axe and pick and camping gear, is rolled in a featherweight oiled-silk tent. It is all neatly stowed and secured immovably with web straps.

The landing gear is an interesting compromise between the desirability of amphibian convenience and the necessity

of complete streamlining. In the interests of higher speed and greater simplicity, Bill Barnes has discarded the complicated amphibian gear used on the Lancer and substituted a simple three-wheel undercarriage of the "tricycle safety type." The main wheels are mounted well back of the center of balance and retract completely into a section of the hollow wing spar. A steerable nose wheel swings backward during flight into a well between the main fuel tanks.

In order to provide for possible water operations, Bill has adopted a substitute landing gear consisting of inflatable rubber floats. These pontoons are constructed of rubber and cord airship fabric, are stiffened by a backbone of metal tubing and are divided into five airtight compartments. They have proven themselves equal to metal floats in every respect and are much lighter in weight.

Sandy explained the procedure of changing from wheels to floats. The Charger is landed on its wheel gear and taxied to the water's edge. The float gear is then unpacked, laid in position beneath the ship. After the N struts and spreaders are bolted into place, a line from an engine-driven air-compressor is connected with the float valves and the pontoons are blown up. When fully inflated, the keels of the pontoons are approximately twelve inches above the ground, permitting the ship to be wheeled into the water. Once afloat, the wheels are retracted and the Charger becomes a seaplane.

Bill Barnes had not returned to the field by the time I left, so I have had no chance as yet to report on the performance of the Charger. Test flights are said to have indicated a top in the neighborhood of 450 m.p.h. With her Fowler flaps fully extended, the big wind lands at around 60. Her ceiling is 37,500 feet.

RIDDLE OF FLYING APTITUDE

(Continued from page 11)

hours of flying instruction. In addition, the student often suffers from interruption of his duties or loss of a job, and the shock of failing, in spite of his most determined efforts, may have a permanent bad effect on his morale.

In case of war, the output of trained pilots would be slowed up, perhaps with disastrous results, by the necessity of having to waste time and facilities on men unable to become good military pilots within a limited time. Obviously the ability to identify these individuals by means of an examination would be of incalculable value. Therefore, in the face of tremendous difficulties, and despite widely held expert opinion that such a thing is impossible of achievement, the search for a way of evaluating and measuring those intangible mental and emotional characteristics which spell success or failure in military flying was begun and still goes forward. (It should be borne in mind that a great many persons unsuited to difficult flying can become safe and satisfactory private flyers.)

During the War a "mental and moral" examination was given flying applicants by an officer of the Signal Corps. This was later taken over by the medical officers and expanded into a "neuropsychic examination," the so-called subjective personality study. The most obvious use of this examination was, of course, to weed out mentally and emotionally abnormal individuals, that is, the mentally unhealthy. But it was also designed with a view to use in the effort to discover the nature of a supposed "unique faculty," flying aptitude, which the physically and mentally healthy might or might not have.

The long and detailed neuropsychic examination used at present in the Air Corps is intended to give the examiner a complete picture of the background, history and personality of the applicant. Without erring very much it may be said that all characteristics which an ordinary person would consider desirable are also desirable in the candidate for flying training. Naturally, even the best have some unfavorable traits. No one is absolutely normal, so the good qualities are weighed against the bad, with the proviso that certain bad traits in themselves are disqualifying. These include such things as a family history of insanity; chronic failures in school and occupations; immoderate use of tobacco and alcohol; frequent terrifying dreams; and abnormal tendencies toward depression, emotional instability, overactivity, submissiveness, seclusiveness, irritability, dullness, lack of initiative, sluggishness, impulsiveness, egotism, sexual abnormalities and criminalism.

In addition, applicants are disqualified on account of certain characteristics technically known as "epileptoid equivalents," to which people ordinarily attach no significance, but which to a trained psychiatrist are indicative of an underlying "nervousness," or instability, small enough to cause no great difficulty in ordinary pursuits but likely to be magnified with disastrous results by the stresses of military flying. These include such things as a history of sleep walking, dizziness, fainting at the sight of blood, nail-biting, chronic headaches, and stammering.

The examiner in making the personality estimate tries to allow for inability or unwillingness of the applicant to answer all questions correctly, and also for his own tendency to err in his estimate because of the generally favorable or unfavorable impression which an applicant makes on him. But it has been found that even the best examiners are unable to judge the traits of another person with any great degree of accuracy. And there is no way to adjust judgments to allow for the personal equations of the judge. Thus the personality estimate has been useful only for eliminating those who show rather marked mental and emotional abnormalities, and also those who show the more mild indications of "nervousness" indicated above. Practically all such persons who have been given flying instruction at the Army schools have "washed out" in short order. And in accidents due to "pilot error," investigation has frequently shown that the pilot exhibited one or more of these traits.

Applicants for Army training are given the personality examination for elimination purposes before they are sent to the flying school. According to Colonel Grow, however, not more than two or three out of a hundred are rejected because of failure on this examination alone. Practically all who show disqualifying personality traits also have disqualifying physical defects.

Only about 33 per cent of all applicants pass both the physical and the neuropsychic examinations. And of these physically and mentally healthy individuals only about 45 to 50 per cent prove to have enough flying aptitude to get through the school.

In an effort to find some clue as to the elusive nature of flying aptitude, an even more thorough psychological examination is made for experimental purposes after arrival at the primary school. Using the data from these examinations, the flight surgeons, in hopes of finding a type making good flyers, for several years classi- (Turn to page 91)

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AIR PROGRESS

(Continued from page 12)

New Zealand recently completed several new airports, making its total now 38, which cost about \$5,000,000. Thirty-two more are under construction.

AIR FORCES

An order for 5,000 light automatic Bren guns, manufactured under license, has been awarded to the John Inglis firm of Toronto. These new high-speed weapons are for the British Government.

The Canadian Car and Foundry Company is constructing 40 Grumman single-seater fighters for the Mexican government.

The Curtiss low-wing fighters ordered by the French government have a top speed of 300 m.p.h.

A new "mystery" plane is being developed by the Airspeed company of Great Britain, and it is believed that it will take the form of a low-wing monoplane, powered with two Merlin engines set as pushers. The control nacelle will be set well aft near the tail plane to allow better all-around vision, fire-arcs and also to enable the pilot to see his wheels when making landings at high speed.

The Supermarine Spitfire, said to be the fastest fighter in the world, is now in regular production and will soon be seen in squadron service.

It is believed that Anthony Fokker intends to build a Canadian factory where he will turn out fast Fokker fighters.

New Zealand has ordered thirty Vickers Wellingtons and five Air Speed Oxford trainers.

Armstrong-Whitworths plan a new Whitley bomber using the Merlin engine which will be called the Mark IV.

Graduating class No. 38-B that came out of Kelly Field on June 16th, consisted of two regular Army officers, one Siamese officer, one Mexican Army officer, four Philippine Army Air Corps officers and eighty-eight flight cadets, according to the Air Corps News Letter. On June 27th the largest advanced class of students in the history of the school entered the Kelly Field station to take up the 38-C course. The class consisted of 66 regular Army officers and 85 flying cadets, a total of 151 students.

Reports have it that three Flying Fortresses of the Second Bombardment

Group, while on a "routine training" flight, intercepted and exchanged greetings with the S. S. *Queen of Bermuda* about 300 miles at sea.

A second class in Autogiro Maintenance and Operation was recently started at Patterson Field in Ohio.

Reports continue to come out of Europe that German scientists have succeeded in perfecting a "death ray" capable of bringing to a standstill any motor using electrical ignition. The system is said to comprise an ultra-short-wave device which completely blanks out the ignition flows and forces the plane down. Some reports have it that the device has been mounted in a few Heinkel 60 type planes.

Four British Vickers Wellesley bombers flew in formation from Cranwell, Lincolnshire, to Ismailia, Egypt, a distance of 4,300 miles, in thirty-two hours on July 8. This mass flight is believed to be a record for long-distance formation flying and beats the Italian mark of Dakar to Rio de Janeiro by about 980 miles.

The War Department has ordered \$14,433,196.88 worth of new fighting planes, and it is hoped that the service will have 2,320 first-class planes within a year. The order includes thirteen Flying Fortresses and seventy-eight two-engined bombardment planes believed to be Martin and Douglas bombers.

Government officials all over the world, according to Norman H. Davis, chairman of the American Red Cross, are reaching the opinion that bombing attacks on undefended cities and civilian populations are bad strategy because of the adverse criticism voiced by noncombatant nations.

Grindell Matthews, noted British "death ray" inventor, is now working on a new form of aerial barrage, using a giant rocket which, after being shot to a height of about 30,000 feet, will discharge a number of parachutes from which will dangle long steel cables intended to entangle the aircraft of enemy raiders. Each rocket will carry fifteen parachutes containing 1,000-foot lengths of wire which will descend very slowly from great heights.

Two Soviet planes recently landed at Vladivostok after a 4,300-mile hop from Moscow to demonstrate the long-range possibilities of the new Red Army aircraft. Reports have it that the flight was intended to show how easily Red bombers could attack Tokyo from Vladivostok, which would entail a round-trip of about 1,500 miles.

The next American Navy airship will be designed primarily as an aircraft carrier, according to reports coming out of Washington. The last Congress appropriated \$500,000 to begin work on the new airship, which will actually cost around \$3,000,000. It will be 650 feet long and have a helium gas capacity of 3,000,000 cubic feet. It will be about half the size of the ill-fated *Macon* and *Akron*, but if successful, plans will include a second ship of 10,000,000 cubic feet capacity.

Great Britain wants 2,100 more pilots, 550 observers, 26,000 mechanics and 3,000 boy apprentices to keep pace with the high-speed deliveries of new equipment which will add about 40 per cent to the Royal Air Force strength by March, 1939.

High flying by fighting units is believed to have destroyed all tactical value of spotting aircraft by means of sound from their engines. According to experts, sound as detected by microphones and the speed of modern planes results in the ultimate "shoot" being from a mile and half to two miles behind the target. New detection devices checking on the infra-red rays from engine exhausts have been invented, according to quiet reports coming out of Washington.

Two Texas towns, Port Arthur and Beaumont, have asked for better aerial defenses to protect the vast oil fields which are so close to the border. At present the only aviation units available are at Shreveport, La., about 180 miles away, and at San Antonio, about 300 miles away.

MISCELLANEOUS

According to a Berlin report, the United States is now the world's leading exporter of war materials, and the greater part of it is airplanes and airplane motors.

The Lockheed company is experimenting with a new plane in which two 260 h.p. Menasco motors have been mounted side by side and geared to a single propeller.

Another move to bring the Wright biplane back from the South Kensington Museum in London is under way. Few in the United States know that the original Wright biplane was destroyed in a Dayton flood and that the plane in London is a replica of the original, with only the original engine and a few of the original metal parts in its construction. The original was destroyed after it had been stored away in a disused shed, some time after the famous Kitty Hawk flights.

fied the students according to various temperamental types. However, according to Major Neely C. Mashburn, Director of the Department of Psychology at the School of Aviation Medicine, "insofar as we know at present, the classification of our applicants into any of the categories will aid us little in trying to decide which individual has potential flying ability and which has not." Thus the idea that a "flying type" might be found, that some unique faculty which determined a person's flying ability might be identified, has been abandoned. The search is now being pressed from a different angle.

"We are dealing here," says Colonel Grow, "with something that is so complex and intangible, and into which enter so many factors, that it is extremely hazardous to attempt to pick any one method."

And according to Major Mashburn: "In the absence of a specific criterion of success, other than that of graduation, as well as an accurate identification of the traits essential to success in flying training, the investigator has only one recourse if progress is to be made, and that is, to assume that certain abilities are responsible for success and develop a selection method to estimate or measure, when possible, what seems to be the more fundamental of these abilities required in learning to fly.

"The gradations in the various capacities of individuals upon which flying skill depends are so small as to escape detection by subjective types of examination. The margin between success and failure in the flying school as expressed by different degrees of skill is so small that the only hope of detection prior to actual trial at the work is through instruments of precision; that is, by objective tests with graphic recording devices."

The new approach, then, is an effort to measure exactly the qualities and abilities which are believed to make up flying aptitude, and to check laboratory results against results in actual training. This exactitude should prove ideal.

Though the flying instructors have been unable to list all the various qualities possessed by successful students, they have been able to point to certain deficiencies which contributed to failure. One of the most obvious of these was slow and poorly coordinated reaction. So the first "objection test" was the measurement of reaction time. Some work of this nature was done by the French and the Italians during the World War. In 1926 a systematic program along this line was begun at the School of Aviation Medicine, then at Brooks Field (now at Randolph), to carry on research which had received some attention previously in this country.

The first machine used in 1926 was a simple reaction time apparatus, de-

signed by Major Frederic H. Thorne of the Medical Corps. Then Dr. L. J. O'Rourke, Director of Personnel Research of the United States Civil Service Commission, who had done some early work in testing flying applicants, constructed the "complex coordinator" with which Army flying aspirants struggled for several years following 1927. The man being tested was required to move a set of airplane controls in response to rather bewildering series of signals from a buzzer and red, white and green lights mounted on a panel in front of him. Both reaction time and coordination were tested.

Later Major Neely Mashburn devised his "automatic serial action apparatus," which is now being used for the experimental testing of new arrivals at Randolph Field. It also measures reaction time and coordination but embodies various improvements over the complex coordinator, the chief of which being that it measures serial reaction time.

Green and white lights are arranged on a panel in double rows. A row across the top of the board responds to aileron control, one up the middle responds to elevator control, and one across the bottom to rudder control. When one or more green lights go on, the controls are moved to light the white lights opposite. When this is accomplished all lights go out and a new set of green lights comes on automatically. Possibility of error in scoring is eliminated, and the student is graded according to the time it takes him to complete the whole test.

The results with these machines represent the greatest accomplishment thus far reported in measuring one component of flying aptitude. There is consistently a much higher proportion of graduates among the high scorers than among the low scorers. But such tests alone do not solve the problem.

The reason, briefly, is this. Without attempting to be exact, it may be said that the high-scoring quarter of a class may prove to have two-thirds graduates and one-third washouts. Thus it would pay to send this group on to the flight department, for the loss in flight elimination of the one-third would be relatively small. The lowest scoring quarter may prove to have one-fourth graduates and three-fourths washouts. Here, unless the demand for pilots was very great, the cost of eliminating the three-fourths would make the price of the successful one-fourth too high. But the difficulty is in the half of the applicants who make scores around the average. Fifty per cent of these are likely to wash out, but under any circumstances it would be necessary to give this group a try in the air, because the high-scoring group would ordinarily be too small to furnish enough pilots.

At present the low-scoring quarter is being given a chance to learn, though it

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is generally agreed it would be economical to eliminate them on the basis of the test.

The fact that a good many of even the high scorers on the reaction and coordination test fail to become good flyers, not to mention the large proportion of washouts among those with average ability in this respect, indicates that other qualities, not measured by the apparatus, are of great importance in flying aptitude. The reports of flying instructors about washouts give a strong hint in regard to the direction future research should take.

Instructors frequently report "poor coordination" as the difficulty, but even more frequently, "tenseness" and "apprehension." As Colonel Arnold D. Tuttle, former Commandant of the School of Aviation Medicine, says, these terms indicate an underlying emotional instability. Consequently flight surgeons are now at work on objective tests which would measure accurately the degree of a man's ability to withstand disturbing or alarming influences without "cutting out," or "going into a storm," as flying school jargon puts it.

Even before the attempt to measure these elusive qualities was begun, flight surgeons made some interesting observations. The physical and neuropsychic examinations are themselves something of a test of a man's ability to be calm under stress, especially in view of the fact that the applicant knows he has only one chance in three of passing. According to Colonel Grow, healthy young men who, while being examined, show a pulse and blood pressure a little above normal, tenseness or slowness in letting the arm fall when dropped by the examiner, perspire under the arms, or get mottled finger tips, have proved less likely to graduate than those who do not show these signs of agitation.

Also, the reaction and coordination machine scores are affected to an unknown degree by emotional characteristics. If applicants knew they might be washed out on this test the effect would doubtless be much more pronounced.

Flight surgeons' observations and the reaction machine, however, cannot eliminate the need for tests which can measure with exactness a man's emotional characteristics, and therefore research along this line is going forward.

With the characteristic reluctance of scientists to talk until they have carried a research project far toward completion, Colonel Grow and Major Mashburn simply say, "We have new tests, but we can make no comments at the present time." However, a very casual dip into the literature of experimental psychology gives a hint as to the lines they might be following.

It is, of course, not "apprehension" itself which bumbles a student's efforts to fly. It is the tenseness, poor coordination and general muscular and nervous

inefficiency which accompany the fear of failure, of the instructor's disapproval, or of height or sudden violent movement. Apprehension is an "emotional feeling"; the badly integrated muscular behavior is an "expression of emotion."

It may be safely said that all flying students experience emotional feelings when learning to fly, some no doubt more than others. And all exhibit "expressions of emotion." These expressions are involuntary actions which are fundamentally related to such instinctive activities as fighting or running away. These call for violent expenditure of great energy. But learning to fly is an activity which calls, among other things, for voluntary and thoughtfully controlled activity. Precise and not vigorous muscular activity is required. "You are overcontrolling—you are leading with your stick—relax," the beginner is constantly told.

Great progress has been made quite recently in experimental investigation of the "mechanics" of emotional behavior. By successively cutting away portions of brains of animals and observing their behavior, and also by watching the behavior of persons who are later found to have suffered destruction of certain parts of the brain, it has been well established that the impulses which set up involuntary emotional behavior originate in one of the lower centers of the brain, called the "thalamus." Above this is the "cerebral cortex," which is the organ of voluntary and controlled activity, that is, of learned behavior as contrasted to instinctive behavior.

According to a new theory of the emotions, for which Dr. W. B. Cannon of the Harvard Medical School is chiefly credited, sensory messages from the eyes, ears, and so on, are all interrupted at the level of the thalamus, and there set up impulses which go in two major directions, back downward to set up involuntary or reflex glandular and muscular "expressions of emotion," and upward to the cortex to start the processes of emotional feeling, awareness of the facts, and conscious and controlled activity.

Suppose our flying student is having a tough time with loops or chandelles. His instructor does them and he tries to do them. A complex interplay of messages takes place between sensory organs, the thalamus, cortex, and the various muscles of the body, for control of which, in effect, the cortex and the thalamus wage a conflict.

Taking the unscientific liberty of being fanciful, we may guess that something like this happens. The instructor starts a loop. The thalamus gets such messages as "sudden violent movement," "earth falling through space," "upside down and falling." The thalamus is a little like a pilot when first put under a blind flying hood. It gets uninterpreted bits of information, and it has a

tendency to act, automatically and thoughtlessly, on this information. If it gets any general impression at all, it is simply one of "emergency," so it sends a quick message which starts the adrenal glands shooting adrenin into the bloodstream, and the body is prepared for violent action and rendered less capable of precise and delicately controlled action—that is, if the thalamus is dominant.

But the thalamus has an interpreter of sensations, and a boss not always obeyed, in the cortex. The thalamus, while it is giving orders, is also passing on scraps of information to the cortex. The cortex puts them together and says to itself, "Only a loop," or "Only a forced landing and that's simple, that field over yonder, a 360° approach"; and sends down a message to the thalamus, "Hold your horses and let me handle this job."

More often, it is not a loop or a forced landing in itself which sets up overactivity of purely thalamic, that is, emotional, processes, but rather a general and vague fear of doing the wrong thing.

For instance, in a student afraid of washing out, the cortex might be sending down messages saying: "Emergency exists, but don't prepare for action." The poor thalamus is left up a tree. It is suited to a simpler world than that peculiar world of aviation into which the cortex has dragged it. To its primitive nature, emergency, or a message from the cortex indicating reason for fear, means just one thing—steam up. If the cortex is relatively strong and has well-established control over the thalamus, it can secure a measure of obedience even under these ambiguous circumstances. If the thalamic "will" is stronger it will probably go ahead with its crude preparations.

Assuming that this theorizing has an element of truth in it, it might be claimed that a high degree of cortical dominance is one of the important components of flying aptitude. But how measure it, accurately and objectively?

Perhaps it can't be done, but there are experiments which might be tried. It is possible to measure very accurately the amount of adrenin in a sample of blood. Dr. Cannon has demonstrated that adrenin is secreted not only as the result of fear, anger and so on, but also upon the application of stimuli such as a pin prick, exposure to cold, and other stressful experiences. Measuring the increase in adrenin as the result of such stimuli might possibly provide a hint as to flying aptitude.

It has been observed that persons with overactive thyroid glands suffer from emotional instability. They overact in emergency situations, are tense and irritable. The neuropsychic and physical examinations, of course, weed out cases of pronounced hyperthyroidism, but extremely small differences in thyroid ac-

tivity may spell the difference between success and failure in two "normal" students. There is as yet no direct test for thyroxin in the blood, but the science of endocrinology is making such rapid advances that such a test may be developed. Research along this line might eventually provide a partial test for one component of flying aptitude.

Changes in the basal metabolic rate may prove a clue. One experimenter, Landis, found the average rates of three subjects by testing them daily for three weeks. Then they went without food for 48 hours and without sleep for 36 hours, and were submitted to a fairly strong electrical shock. Dread in anticipation of the shock caused the metabolic rate to increase 16, 29, and 48 per cent respectively for the three subjects. When the shock actually occurred, metabolism dropped back quickly toward normal. An excitability test for aviators might possibly be worked out along these lines. Good chance there for the cortex to tell the thalamus that "something is going to happen, but hold your horses."

Some way of measuring the ability of an individual to refrain consciously from reflex movements such as gagging when the throat is tickled, or flinching when stuck with a pin, might prove of value.

The rate and manner of breathing is considered by some psychologists a reliable indication of the degree of excitement, as in attempts at deception. It is claimed that persons when lying have a tendency to prolong expiration and shorten inspiration. The psychologist, Benussi, demonstrated in 1924 that when a person is telling the truth the ratio of inspiration to expiration before answering a question was greater than after answering. When lying the ratio before answering was less than afterwards.

In the Link blind flying trainer the Army already has a machine which might be used to test a candidate's ability to subject emotional to conscious activity. It might be difficult to devise a precise method of scoring the reactions of subjects in the trainer. It is certain, however, that the trainer provides plenty of stimuli to emotional reactions. Expert pilots not adept at blind flying can "blow up" completely in it. It might be possible to give candidates a series of tests in this machine and thus gauge fairly accurately their capacity for controlled reaction. Blood pressure,

pulse and breathing tests could be given to subjects in the trainer with possibly valuable results.

Even if a method of measuring a person's ability consciously to minimize the effects of emotion can be found, that will be only one more component of flying aptitude isolated and measured. It would be necessary to find the relation of a certain degree of this capacity to other capacities. Too great a tendency to "fly with his cortex" might handicap a student. He must use conscious processes to a great extent when he first begins learning. But unless he is able to learn numerous correct responses and then to relegate control of them to subconscious parts of his mind, that is, to involuntary levels below the cortex, he remains a mechanical flyer and cannot progress far. Many a student has been washed out on account of this. An Air Corps colonel of long experience once remarked that mechanical flyers get along well in blind flying, but the Air Corps needs men who can learn to fly not only under a hood but also "by feel" when other matters, such as fighting, demand his conscious attention.

Can a test be devised to measure this capacity quickly to form habitual patterns of response? And can numerous other capacities which enter into flying aptitude be isolated and measured with precision? Perhaps so, perhaps not.

Colonel Grow emphasizes the fact that research is aimed at dividing applicants into groups which contain relatively high and low proportions of potential flyers. "An individual may be deficient in certain qualities," he says, "but have a remarkable capacity to compensate for his deficiencies by exercising other capacities which he may possess in a high degree. This ability to compensate may be great or small. In some cases it is very great." It is a matter of record that Wiley Post flew for years with only one eye. Guymer, the great French ace, did his best work while gradually dying of pulmonary tuberculosis. Leech, the crack Canadian pilot, had a wooden leg.

"Except in certain extreme cases," Colonel Grow says, "it is impossible to say that a man cannot become a good flyer. But we have already made considerable progress in classifying men into groups which produce high and low proportions of men able to make the grade in military flying. We hope to go much further along this line."

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JUMP

(Continued from page 23)

do a little photographing after I succeeded (maybe) in getting the three canopies inflated.

Contrary to popular supposition the most successful and long-lived "silk sailor" conscientiously plans and theorizes on each new experiment he is contemplating. In this business today hit-or-miss methods no longer go. The daredevilry of the last decade has been superseded by hard and close figuring. Usually the first mistake is the last. Consequently in making preparations I carefully plotted the positions I estimated the three open 'chutes would take, going on the knowledge I had previously gained with two. Allowing for sufficient air flow after the second was open, I felt the third could be easily inflated if it could be kept from wrapping itself around my feet and legs.

Safely on the way down and having successfully opened all three with a minimum of difficulty with the third, I soon found the positions estimated for the open canopies were correct. Air spilling from the peripheries of the individual 'chutes tended to hold each away from the other for the entire descent. Although they yawed constantly I don't believe they touched each other for more than a fraction of a second the entire way down. Developing the photographs taken overhead, I found that none of the prints showed more than two canopies at one time, thereby proving that they held their distance admirably. Suffice to say the rate of descent was reduced materially.

Another type of parachute jump that I have made, on occasions when there was sufficient money at stake, and which is a guaranteed thriller for both the principal as well as spectators, is a several-thousand-foot delay from any altitude over three thousand feet, opening the 'chute when as close to the ground as you think feasible or sufficiently close to draw oh's and ah's from the crowd. This is always a good act when your air show seems to be dying on its feet for lack of thrills. I well remember the first one I made in the form of a practice attempt to find out if I had enough to put on a finished exhibition later.

This day, in early December, was exceedingly cold, and we had announced through the local journal that an ordinary parachute jump and passenger hauling would be the order of the day on this particular Sunday. I was especially anxious that no mention be made of the coming experiment in the event I should deem it necessary to open embarrassingly high. For the try I chose a regulation Irvin twenty-four-foot back pack with the standard twenty-two-foot chest or

emergency pack as required by the Bureau of Air Commerce.

Fortunately, it so happened, two Army flyers were visiting the local port over the week-end, and the loan of one of their heavy winter flying suits was easily arranged. The necessity for this useful piece of equipment was apparent from the ground temperature, which indicated that the three-thousand-foot level would no doubt be airish.

Thus garbed, like a deep sea diver, in flying suit, helmet and parachutes, I waddled out to the J-6 9 Travelaire and was helped aboard. How I was to get out with all these accoutrements never occurred to me until we were off the ground, but on the way up I consoled myself with the thought that, for some reason, it is always easier to get out of a ship in flight than when on the ground.

The climb to the three-thousand-foot level was uneventful and comparatively swift due to the cold and buoyant air. All the way up I sat on my hands to warm them and occupied my mind in trying to estimate the increase or decrease in wind velocity by watching the drift but, as had always been the case, with little success. On the ground it had been at least eighteen miles and up here I naturally supposed it was stronger. As can be imagined, in delayed jumping particularly, wind drift is a vital factor, and if the airport is small, your estimate must be pretty well exact, and the delay once begun must continue to the lower elevation at which you have predetermined to open, or the field will undoubtedly be missed by a considerable margin. With this in mind I squeezed out of the pit and laboriously climbed onto the wing with the below-zero slipstream trying its best to tear me from my precarious perch. Numb though my hands were I managed to turn around and assume a sitting position on the wing's trailing edge with my feet dangling in the breeze.

With cut gun we munched across the field and to a point I judged to be about a half mile from the up-wind edge of the toy-sized airport below. Grasping the rip cord feverishly I tumbled headlong into space for my first free-fall delayed jump.

While my mind was decidedly clear and photographic the resulting impressions gathered were, it must be admitted, somewhat blurred as well as unreal. First, the leisurely somersaulting of my body in slow but consistent loops was something I had not endured for any great number of times. The sensation of watching the sky and the ship I had so recently left and then glimpsing the rushing ground was a sight beyond compare. The ground did not appear to be coming up to smack me in the face, as you readers have no doubt read or heard of; instead, I knew and felt I was actu-

ally rushing at it at one hundred and twenty miles per.

The excessive cold now had long since been forgotten in the excitement of the fall. As I watched my clothing flapping in the gale the predominating urge was to roar with laughter. Just what was so funny I couldn't say. Breathing was difficult now that I had consumed one thousand feet and reached terminal speed. I found that while on my back breathing came normal, but when face down in the rushing cold air, short breaths had to be sucked in by sheer force.

When it appeared the fifteen-hundred-foot level had been reached my hand began caressing the rip cord and easing it from its pocket. While one part of me was urging to keep delaying for a better show the other was crying to pull the ring. The deciding factor, in this first jump as in all others I later made, was not so much myself but the position of my body when I wanted to open the 'chute. Theory and others' accounts kept the thought paramount in my mind that a 'chute should be opened in only two positions to avoid fouling and prevent the possibility of the jumper rolling up in its silken folds as it streams from the pack. Often, afterward, when I knew I was dangerously near the ground, I'd purposely wait another fraction of a second until I'd twisted from my back-down position to a belly or head-down one. It was this short wait on the first jump which brought me so close to the ground that I actually scared myself.

Doubling into as much of a knot as possible I tugged the ring. It is a curious fact that never in my career as a jumper had I ever felt the 'chute burst from its pack nor the shroud lines play out. Often I'd watched the silk fly past my feet and many times shaken an arm or leg to facilitate its passing, but this time the first indication from the 'chute was when it slammed my body violently into the linen webbing of the harness. Opening shocks had been described to me and I had heard numerous old-timers tell of how they were black and blue for days, but I was totally unprepared for the beating I took that day.

With that experience, five years of jumping, and two hundred and twelve successful jumps behind me without a single opening failure or serious accident, I cannot but have the utmost affection for and confidence in the parachute of today. With rigid Bureau of Air Commerce specifications governing their manufacture and rigid inspectors supervising their periodic sixty-day servicing under licensed riggers, there is no reason why even the most prosaic pilot or flyer cannot snap on his 'chute and fly the airways today with the utmost peace of mind and confidence.

MODEL MATTERS

(Continued from page 66)

advisable to divide the entries into two classes—modern and obsolete aircraft.

Tractor models with built-up fuselages dominated the stick event. A few twin-pushers were entered but their performance was noticeably inferior to the tractors. Robert Hoffmeyer won the Mulvihill Trophy. His flight of 10:24.4 was remarkable since the wind quickly blew the models out of sight.

The length of flights turned in by the winners proves the competition was keen. For example, in the list of outdoor cabin winners, there were 12 flights of over 10 minutes. Flights that would have been sure place-winners in previous nationals fell far down in the listing of the 1938 winners.

This was especially true in the gas model competition. The utmost in climb was necessary to make full use of the 30-second allowed motor run. And a flat glide was necessary to stretch the altitude into a long flight. Few of the models failed to measure up to these qualifications and favorable currents played a too important part in deciding the winners. Unfortunately, the great number of entrants in the gas event made it necessary to run the event two days—Friday and Saturday. Weather conditions varied considerably. Entrants flying on Friday suffered the handicap of clouded skies and a scarcity of helpful currents. Saturday was windy and flying was tricky. However, the bright sun stirred up plenty of helpful air and the long flights were all made on this day. Weather conditions play such an important part in deciding the outcome of a gas model contest it doesn't seem fair to compare one day's flying against that of another. But this method is undoubtedly the easiest way of taking care of the increased number of contestants.

A few minutes before the contest closed Saturday afternoon, Milton Kahn of Philadelphia launched his model on a 23:41.4 flight. This was the highest time of the two days' flying. He won the Gar Wood Trophy for one year. In winning this event he nosed out Howard Carlson of Milwaukee, whose time of 14:43.8 was regarded as a sure winner. Both these flights were made in the open class. Ed Manthly of Maywood, Ill., led the senior division with 6:50.

The radio-controlled event held promise of being the most interesting of the contest. A half-dozen entrants were on hand with complete equipment. Many of the models had two controls—rudder and elevator. Walter Good of Kalamazoo, Mich., was awarded 1st. He was the only one who tried a flight. While launching the model the trimmer on the elevator was bumped out of adjustment. The model stalled and dove

in before Good was able to correct it with the ground transmitter.

The remainder of the contestants did not tempt fate by flying in the high wind. They demonstrated their equipment on the ground and the judges made their awards on that basis. Clinton B. DeSoto of Hartford, Conn., had a large model of the Cub equipped with a two-control radio apparatus. It weighed about 25 pounds and at first glance seemed almost as big as the Cub itself. It was powered with a twin cylinder opposed Forster, made especially for it.

Indoor flying was held in the dirigible hangar at the Gross Ile Airport. The friendly feud between Jeff Harris of Toronto and Carl Goldberg was renewed. Last year Harris took the indoor stick event with 20:37, while Carl was second with 20:05.8. Tables were turned this year. Goldberg was first with 19:11.6 and Harris a close second with 18:42.2.

Hewitt Phillips of Boston, Mass., won the Stout indoor trophy with 21:53.8.

Milton Huguelet, Chicago, Ill., took the Bloomingdale Trophy for indoor cabin fuselage models. James Cahill, Wakefield winner from Indianapolis, was runner-up. Competition for the Bloomingdale is for builders under 21 years. However, the outstanding cabin fuselage flight was 16:01 made by Henry Struck, New York City. He took first in the open class.

Honors for the best individual contest performance went to Milton Huguelet, a member of the Chicago Aeronuts. His flights were excellent in practically every event. He won \$200 cash and the Exchange Club Trophy. Leo Bailey was second high-point winner, getting a free 1000-mile trip on American Airlines.

The Akron group won the award for the most active club delegation. The Chicago Aeronuts were second.

The Berryloid contest for the best finished gas model brought out a line up of beautiful models. Harold Coovert won this event. His model was practically perfect. The most careful inspection did not bring to light the slightest flaw or blemish in the finish. Coovert is from Dayton and has been doing good work for many years. His model is a good flyer as well as a good looker.

Contest procedure was well worked out. H. M. Jellison did a mighty fine job as Contest Director. But that isn't startling, since Jellison always does a good job where the interests of the model builder are at stake. He was capably assisted by hard-working Arthur J. Vhay, in charge of operations. Members of the Model Aviation Department of the Detroit Recreation Commission checked

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and weighed the models. Thoroughly familiar with all the rules, they did a capable job to the satisfaction of the contestants. Uniformed timers were on hand from Selfridge Field.

Food throughout the days of flying was provided by the Chevrolet Motor Company in the form of box-lunches. The Ford Motor Company provided free bus transportation between the airport and Detroit. But the bulk of the expense and the trouble fell to the Exchange Club of Detroit. And they didn't spare any effort to make the meet a success. The job they did is even more outstanding when considering the little financial help that depression-hit Detroit was able to offer.

A banquet aboard the lake steamer, Greater Buffalo, was the last official item on the 1938 model meet program. The banquet included two necessary features of every national meet—a free dinner and the awarding of prizes. After the food had been disposed of, the winners carried away prizes—cash totaling \$500, trophies, air line tickets, radios, cameras, watches, medals, motors, and other items too numerous to mention.

It was a wonderful meet, appropriate in every respect to the fastest growing hobby in the world—building and flying model airplanes.

CONTEST WINNERS

(First 3 only listed)

Outdoor Cabin Event—Junior Class		
Arthur Beckington, Rockford, Ill.	31:08	
Billy Riffel, Frontenac, Kan.	2:30	
Pasquale Fulmano, Syracuse, N. Y.	2:14	

Outdoor Cabin Event—Senior Class		
Leo Bailey, Akron, O.	23:35.4/5	
Kenneth Lane, Milwaukee, Wis.	23:29	
Morris Huff, Milwaukee, Wis.	19:24	

Outdoor Cabin Event—Open Class		
Frank Zaic, New York, N. Y.	17:06.1/5	
Lavelle Walters, Windsor, Can.	8:25	
Henry Thomas, Akron, O.	8:08	

Outdoor Stick Event—Junior Class		
Mike Gajdos, Akron, O.	5:19	
Carter Squire, Chevy Chase, Md.	3:48.2/5	
Bob Romelster, Indianapolis, Ind.	1:50.4/5	

Outdoor Stick Event—Senior Class		
Robert Hoffmeyer, Jr., Akron, O.	10:24.2/5	
Wallace Simmers, Chicago, Ill.	9:25	
Milton Huguelet, Chicago, Ill.	6:30.2/5	

Outdoor Stick Event—Open Class		
Conrad Renning, Minneapolis, Minn.	5:26.2/5	
Alvin Gaskill, Atlanta, Ga.	4:43	
James Matulis, Chicago, Ill.	4:20.4/5	

Indoor Stick Event—Junior Class		
Edward Domohowski, Boston, Mass.	15:08.1/5	
Arthur Beckington, Rockford, Ill.	12:27.1/5	
Mike Gajdos, Akron, O.	9:41	

Indoor Stick Event—Senior Class		
W. Hewitt Phillips, Belmont, Mass.	21:53.4/5	
Milton Huguelet, Chicago, Ill.	21:06	
Walter Lees, Phila., Pa.	20:34.1/5	

Indoor Stick Event—Open Class		
Carl Goldberg, Chicago, Ill.	19:11.3/5	
Thomas Harris, Toronto, Can.	18:42.1/5	
Ed Fulmer, McKeesrock, Pa.	18:14	

Indoor Cabin Event—Senior Class		
Milton Huguelet, Chicago, Ill.	13:50	
James B. Cahill, Indianapolis, Ind.	13:2/5	
John Stokes, Jr., Huntington, Valley, Pa.	12:42	

Indoor Cabin Event—Open Class		
Henry Struck, Jackson Hts., N. Y. C.	13:01	
Bruno Marchi, Boston, Mass.	12:22.2	
James Matulis, Chicago, Ill.	12:01.8	

Flying Scale Event—Senior Class		
Leo Bailey, Akron, O.	19:52	
John Ogilvie, New York City	15:09	
Sydney Wallerstein, Boston, Mass.	12:53	

Flying Scale Event—Open Class		
Henry Struck, Jackson Hts., N. Y. C.	65	Points
Wm. Gough, Jr., Chicago, Ill.	53.3/5	
Henry Thomas, Akron, Ohio	53.3/5	

Best Finished Models		
1. Frank Merritt		
2. Max Sokol		
3. W. E. Gough, Jr.		

Power Model Event—Junior Class		
George Gerpheide, Kalamazoo, Mich.	1:37.1/5	
Bob Randolph, Kenmore, N. Y.	1:28	
Ray Beaumont, Phila., Pa.	1:26	

Power Model Event—Senior Class		
Ed Manthey, Maywood, Ill.	6:50	
Bushan Deshick, Chicago, Ill.	6:25.2/5	
Robert Toft, Minneapolis, Minn.	6:10.2/5	

Power Model Event—Open Class		
Milton Kahn, Phila., Pa.	23:41.2/5	
Howard Carlson, Milwaukee, Wis.	14:43.4/5	
Richard Staab, Akron, O.	6:52.4/5	

Best Finished Gas Model		
Harold Covert, Dayton, O.		

Radio-Control

Walter Good, Kalamazoo, Mich.	
Clinton DeSoto, Granby, Conn.	
Howard Flanagan	

Wakefield International Team

James Cahill, Indianapolis, Ind.	8:11.2
James Bohash, Jr., Detroit, Mich.	6:15.2
G. J. Wisniewski, Milwaukee, Wis.	5:11
George DeLaMater, Oneonta, N. Y.	5:48
Henry Stigemeier, Inglewood, Cal.	4:03
Ted Just, Johnstown, Pa.	2:51

American Moffett Team

Arthur Beckington, Rockford, Ill.	31:08
Leo Bailey, Akron, O.	23:35.8
Kenneth Lane, Milwaukee, Wis.	23:29
Morris Huff, Milwaukee, Wis.	19:24
Edward Pleken, Rockford, Ill.	18:43
Frank Zaic, New York City	17:06.2

Canadian Moffett Team

Roy Nelder, Toronto, Ontario	10:35.6
Lavelle Walters, Windsor, Ontario	8:23.8
Fred Bower, Toronto, Ontario	4:59.2
Robert Milligan, Toronto, Ontario	4:45
Ray Smith, Windsor, Ontario	2:03
Thomas Harris, Toronto, Can.	1:26

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(Continued from page 21)

regrettable, but necessary. In passenger flying they have to get there also, but their keynote is to get there safely.

A recent and oft-quoted remark is that it is "fare" and not "fear" that keeps people off the air lines. It is a very catchy expression, but like the white of an egg you've got to whip it a lot to make it stand up. It's a good deal like the remark of an automobile manufacturer back in 1928. He said that the fare of aviation would come down to the level of the motor car when the fear of aviation was reduced to a minimum. He went on to say that this fear would be eliminated when aviation was killing as many people annually as the automobile. Heaven forbid that such a penalty should ever be exacted of aviation!

The younger generation has cordially embraced the idea of flying. A few decades ago they were building pushmobiles and roller-skate scooters, but the boys of today are building model airplanes. It is only a step from the model airplane to the glider, to the light plane for personal use, to the airplane for transportation. The youth of today will

be the personnel of the aviation industry tomorrow, and they will be qualified to do a good job of it. Fear will have been conquered by familiarity.

But it will be a long time before airplanes will be running in competition with busses for the simple reason of the difference of cost between a bus and a first-class airliner. Too, there is the difference in cost of operation. Bus depots, for instance, are inexpensive affairs compared to an airdrome.

There are, however, an ever-increasing, intelligent traveling public who have investigated the question of safety and fares and have found to their satisfaction that *air travel is safe*, and to their pleasant surprise they have discovered that taking into consideration the value of their time, meals and comfort, the price of flying is no objection at all. In many cases it is actually cheaper to fly than to travel by any other form of transportation.

Just how safe is flying today? To answer this all-important question I sought information from the man I thought was best qualified to tell me about the dangers of flying. Not because he is a great aeronautical engineer who has designed our flying queens of the air or any of the devices comprising their safety equipment, for he is not, but because first of

all he is a flyer of proven ability, as well as a business man of sound judgment, but above all because he will bet you five thousand dollars to "two-bits" that you will arrive safely at your destination if you travel by air. Money talks with a loud voice and in most cases these odds would kill a lot of fear. I refer to Major Reed Chambers.

Reed Chambers as a World War flyer brought down a lot of German planes, is in fact the second American War ace, second only to Captain Eddie Rickenbacker. He has been engaged in some form of aviation industry ever since the Armistice and is regarded as the outstanding authority on aviation insurance in the United States, being Executive Vice-President of the U. S. Aviation Underwriters, Inc. He has brought into the aviation insurance business the same steady courage and resourcefulness that won him honors in France. He has specialized in the study of air safety, he knows percentage as applied both to aviation and insurance, and he knows that at the odds he offers he can make money for his company.

Going into a huddle with Major Chambers, making a lot of chicken tracks with pencil and paper, I emerged with the startling information that the rates for insurance of air passengers are prac-

tically the same as the rates for passengers traveling by train.

Railway insurance covers the passenger for a period of twenty-four hours. Aviation insurance for the same amount and at the same rate covers approximately four hours. Figured on a mileage basis it is the same. A five-thousand-dollar policy, covering death and dismembering, for a flight from New York to Chicago, costs twenty-five cents and the flying time is four hours. Some of the fastest modern extra-fare trains make it from New York to Chicago under twenty-four hours. If you were flying from New York to San Francisco your five-thousand-dollar policy would cost you a dollar.

Sometime around 1918 Horatio Barber, now no longer in the business, brought out the first aviation insurance. For a number of years it struggled through a period of experimentation that brought nothing but financial loss and heartache. Rates were prohibitive and most insurance companies had a clause in their policies that nullified them in case of air travel.

Since 1930 the picture has grown brighter and brighter. Two years ago an experimental policy was issued in blanket form to employers to cover their representatives who traveled by airplane. At the phenomenally low rate of \$1 per thousand per year, this policy was taken advantage of by the larger companies until today there are thousands of air passengers covered by these blanket policies. This policy covered business flying only. For \$1.10 per thousand it covers both business and pleasure flying.

For individuals who fly a great deal but have to pay their own way a policy is issued that costs \$1.80 per thousand for a period of twelve months. These policies may be taken out in amounts up to twenty-five thousand dollars on each individual.

These group policies were so successful that in the fall of 1937 a new general policy of passenger insurance was brought out, covering death and dismemberment. These policies cover anyone who flies in the United States, and a five-thousand-dollar policy can be bought at any ticket agency or airport for twenty-five cents.

Due to the very nature of their intensive training and flying service, the Army, Marine and Navy air forces have the greatest number of fatalities, but even the members of these services are now eligible for these cheap rates of insurance.

The Aero Insurance underwriters have just issued a policy that certainly puts them on the spot as having faith in the present-day safety of flying. For a premium of \$3.50 they will issue a policy of five hundred dollars for a period of

six months, and, of all people, this policy covers student flyers.

But don't get it into your head that these insurance companies are working for the aviation companies or the air lines. There is nothing philanthropic about these low rates of insurance. To the contrary, the whole insurance business, of whatever nature, is based on the laws of percentage, and their figures prove to them that the death rate among flyers and air passengers is very low indeed.

It is not due to any one specific thing that these reductions in insurance rates have been brought about. Safety has been built up through several factors and years of study and application.

The research laboratory has played an important part in this constant search for safety. Steel, nickel, copper and various alloys have been developed to combine lightness with strength. Metal has taken the place of wood and fabric. Strength and security have resulted.

Equally gigantic strides have been accomplished in gathering and disseminating information about the weather, and closely connected with this has been the development of aviation instruments. No longer does the pilot fly by rule of thumb, buzzing his way across the country by picking out smokestacks, hayricks, rivers and like landmarks, depending on his compass for his general direction and with no way of knowing accurately his drift or what kind of weather he is flying into.

Today radio beams keep him on a straight course to his destination, two-way radio communication keeps him posted on weather conditions. Flashing beacons at night light his route from coast to coast. The Sperry robot pilot saves a lot of wear and tear on his nerves and reduces air fatigue.

During the year 1937 Major Chambers flew some 67,000 miles over the airways of the United States. He and his associates investigated every mishap occurring on the major air lines in the United States that resulted in loss of life. They received and studied the reports of all other investigating agencies. They have the reports on construction and performance of every type of airplane and motor engaged in the business of flying passengers. When any new device is brought out that has to do with the safety of flying, they get the reports, study them and apply their findings to their rate cards.

The insurance companies' investigations have convinced them that in the majority of commercial aviation accidents the cause was the failure of the human element rather than mechanical.

They do not consider the failure of the radio as a major contributing cause of airplane crashes. As they point out, the modern pilot is trained in blind fly-

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ing, relying only on the instruments in front of him, and that most of the passenger routes were flown successfully before they had the aid of radio communication or the radio beam.

Weather conditions sometimes become too bad for safe flying. However, with observations obtained from fifty or more upper-air reporting stations, and observation planes in various parts of the country flying daily to an altitude of 20,000 feet with their aerometrographs automatically registering weather conditions at each thousand-foot level, ignorance of weather conditions is no excuse. Periodically throughout the day weather maps are prepared showing the general atmospheric condition over all areas. These forecasts are transmitted by teletype and radio over all major air lines. Planes in flight radio in frequent weather reports.

If the weather at the point of take-off is considered unfavorable for flying and there is no prospect of improvement the flight is canceled. If unexpected or freakish weather is encountered while in flight, the pilot may either turn back to his starting point or take advantage of one of the emergency landing fields that are strung out across air routes.

Strangely enough, one of the most common mechanical failures noted by the insurance company is the loss of a propeller while flying, and the percentage against this happening is about a

million to one. No doubt the most feared danger, because it is the most publicized, is ice forming on the propellers and wings and forcing the plane down by sheer weight, or freezing the controls. In the past this has been a real danger, but fortunately remedies have been perfected to overcome this.

Contrary to the arguments of some of the old-time pilots who relied solely on a compass, altimeter and tachometer for guidance, the multiplicity of instruments in front of, and even above and below, the pilot, does not confuse him but tends to build confidence.

The array of instruments keeps them posted on almost everything from the condition of their spark plugs to the position of their retractable landing gear. So accurately do these instruments function that flying schedules are run almost to the minute.

The standard flying time for pilots is eighty-five hours per month, a thousand hours a year. Still, you will find plenty of pilots with ten thousand hours or more. The American Airlines have ten pilots with more than twelve thousand hours of flying time. Joe Glass, who flies the Glendale-Dallas route, has piled up a record of fifteen thousand hours, while Robert Jewell has bumped the clouds around for a little matter of fourteen thousand hours. When you figure up just how many ground miles that means, how many safe take-offs and landings are represented, it would have

to be a rather jittery person who would be afraid to fly with these men.

The first and most important word in the lexicon of aviation is "safety," and it is stressed throughout the industry, from the selection of materials used in manufacturing planes to the personnel that builds and services and operates them.

Technically, the insurance companies do not always agree with the official reports as to the cause of an accident. If a plane were to take off with an empty gas tank, and crash as a result, it would probably be reported officially as a mechanical fault. The insurance people say that if the human element had not failed through carelessness the tank would have been filled. Recently a radio head-set jammed the controls of an airliner and caused it to crash. Again it was a mechanical failure due to the failure of the human element to foresee it. Immediate steps were taken, however, to see that it did not happen again. (The term "failure of the human element" does not necessarily apply to pilots alone, but applies to the entire industry—manufacturers, testers, servicing crews, dispatchers, etc.)

Today there are three insurance companies in the United States who are ready to insure anything aviation, at rates which a few short years ago would have been called impossible. Hard work, sacrifice and education have made flying safe, and twenty thousand to one are the odds that say so.

EX-MECHANIC

(Continued from page 20)

procedure; everything was now in readiness for taking off.

Eddie's satisfied feeling as the two powerful Hornets pulled the big ship from the surface of the bay toward the cooler temperatures aloft can be appreciated by any real aviation mechanic. It was his brain, plus his hands, that transformed the crippled left engine from a half ton of metal into a thing powerfully alive.

Operations headquarters, upon receipt of the ship's departure message, radioed Captain Parsons orders to proceed directly to Recife non-stop, thereby making up the delay. Recife was the scheduled over-night stop, and was equipped for night landings. Weather conditions were favorable, and the trip was completed without further difficulty.

Two nights later at the Queens Park Hotel in Port of Spain, Trinidad, the passenger who had remained aboard the barge at Ilheos seated himself alongside Eddie on the porch, and after a greeting, said, "I'd like to have a talk with you, Mr. Beale. This is my card by way of introduction."

Eddie glanced at the card which read:

"Geo. L. Hornby, Vice-President in Charge of Sales, Federated Aircraft Corporation."

How well he knew of Federated Aircraft Corporation! It was one of the outstanding manufacturers of large flying boats in the United States, and had only recently been authorized by the Navy to release its ships for export. Eddie pocketed the card, at the same time expressing his pleasure at meeting Mr. Hornby.

"I have been talking to Captain Parsons," continued Mr. Hornby, "and he advises me that you might possibly be interested in a position with Federated. Is this correct?"

It was all Eddie could do to answer with a surprised nod.

"Well," said the business man, "we need a pilot who can do a little more than merely fly a plane. Parsons assures me regarding your flying ability, and the remainder I have seen for myself. For example, recently we almost lost a seven-hundred-thousand-dollar order from a South American government simply because one of our pilots didn't know what you do about direct-drive starters. He took a load of government officials up the river on a demonstration trip. While the party was ashore having lunch, the radio operator exhausted

both batteries handling some long-winded radiograms for the *ministros*. The result was that several hours were lost trying to start the motors by hand, and by the time some fresh batteries were obtained, it was too late for the party to return. We substituted electric inertia starters, with which, as you know, even one man can start a motor by hand if necessary, and finally, after considerable lost time, concluded the sale."

Mr. Hornby lighted a cigar and continued, "Federated expects to do quite a bit of business in South America. There will be frequent ferry trips from the factory delivering equipment and a certain amount of instruction work indoctrinating the purchaser's pilots into the proper method of handling our type ships. You can easily understand, Beale, satisfied customers will mean additional sales, and we haven't even scratched the surface down there yet. We pay our pilots six fifty and expenses. How would you like to go to work for us?"

This really took Eddie's breath away, but he managed to choke out, "I'd like to very much, Mr. Hornby—er—only, you understand I haven't a college education."

Mr. Hornby laughed and replied, "Neither have I, but somehow I've managed to make a living without one."