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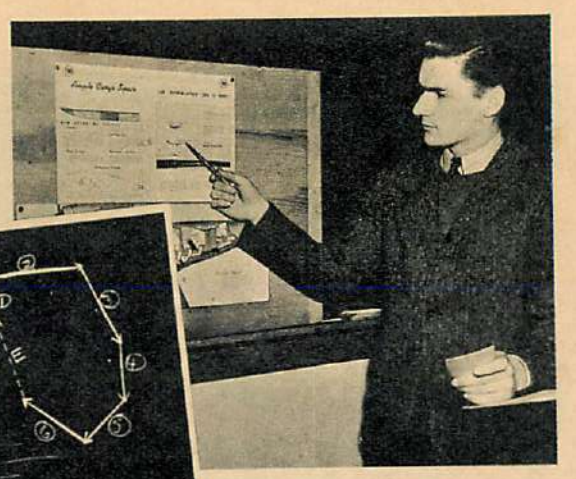

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Left — *The how and why is demonstrated in the Parks physics laboratory.*

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AIR TRAILS

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FEATURES

DEPARTMENTS

MODEL SECTION

FULL-COLOR COVER PHOTO OF VOUGHT-SIKORSKY XF4U-1
BY RUDY ARNOLD

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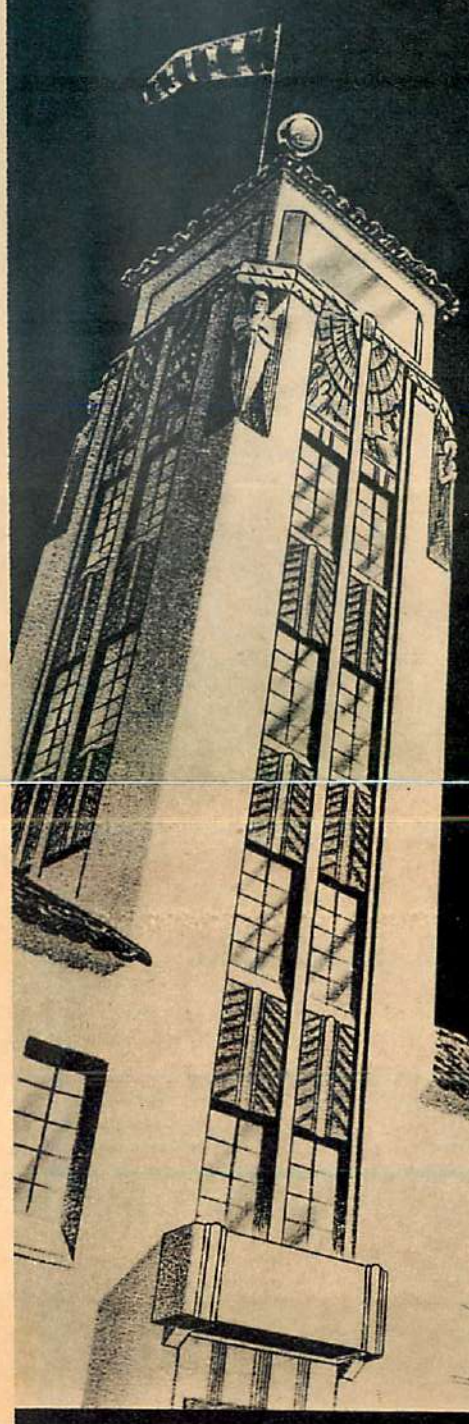

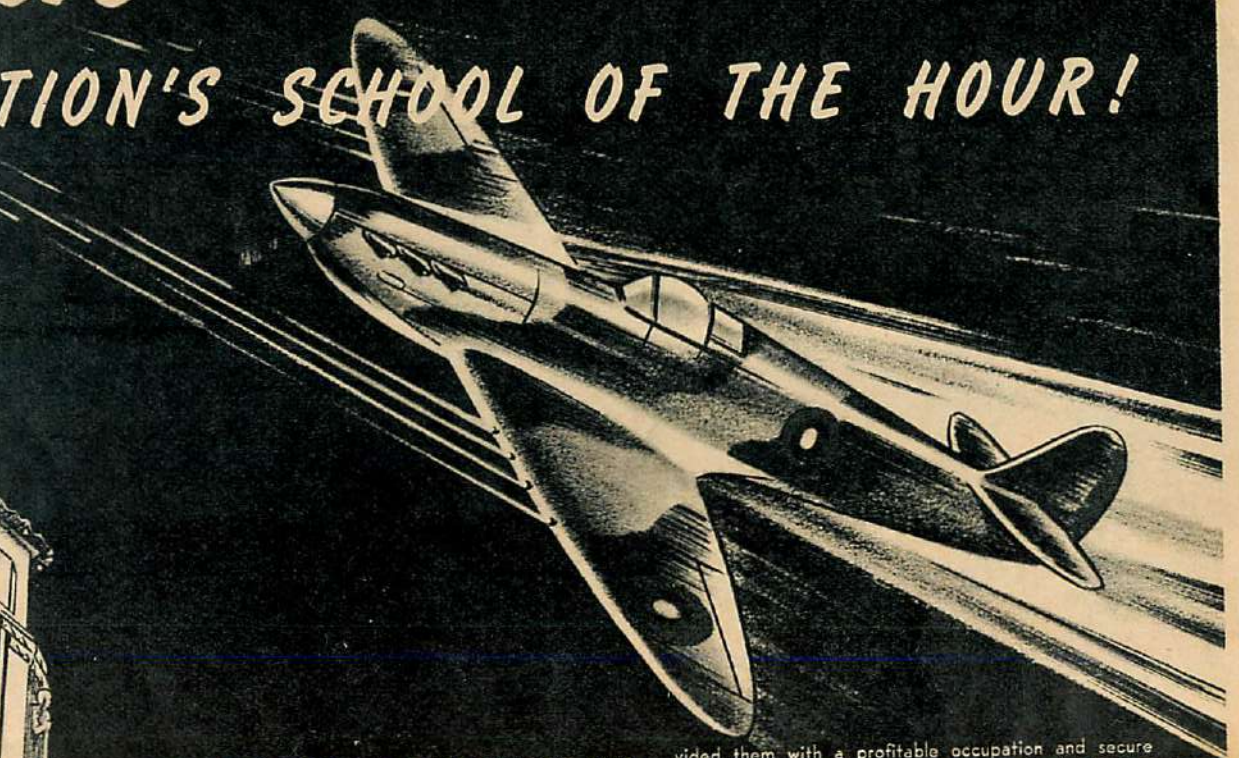

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Question: It is difficult for me to figure out the calculations and the purpose of the gyro compass and the gyro-horizon. Can you send me the directions for reading both? F. U., East Chicago, Ind.

Answer: The purpose of a gyro-compass, otherwise known as a directional gyro, is to indicate deviation from the compass course. It is used in conjunction with a magnetic compass. Being a gyroscopic device, the directional gyro has no lag, does not oscillate or spin. The gyro-horizon indicates the attitude of a plane in flight in relation to the true horizon and is used in blind flying to keep the ship on even keel. For information on how to use these instruments write to the Sperry Gyroscope Co., Inc. Flatbush Ave. Extension, Brooklyn, N. Y.

Question: Could you tell me in what type of plane Corrigan flew to Ireland, how much gas it carried and what engine it had? R. H., Durand, Wis.

Answer: Corrigan used a Curtiss Robin cabin plane powered by a five-cylinder Wright J6-5 radial engine of 175 h. p. We do not know how much gas he carried, but would guess not less than 300 gallons.

Question: How old does one have to be to get a flying license and how many hours does one have to have? E. G. G. Zittstown, Ohio.

Answer: The minimum age requirement for a flying license is eighteen years. For a private pilot's license one must have at least thirty-five hours of solo time, and for a commercial, 200 hours.

Question: Can you tell me if there is any chance for me to obtain a private license if I am partly color blind? C. S., Milford, Mass.

Answer: Sorry, but we cannot give you any advice on medical questions. Suggest that you consult a Civil Aëronautics Authority medical examiner.

Question: Could you please give me information on the Heath Parasol plane, the address of the company and the price of their kits? D. R., Salem, Ore.

Answer: We doubt that Heath is making up kits of their Parasol any longer. However, write to them. The name and address is the Heath Airplane Co., Benton Harbor, Mich.

Question: I would like to know if there is any book published which has photographs and specifications of all airplanes in the world. Where can I obtain it and how much does it cost? A. A., Des Moines, Ia.

Answer: Janes' "All the World's Aircraft" has photos and specifications of all airplanes. It is published by Sampson Low, Marston & Co., London, England. The price is $15. Another book similar to it is "Aërosphere," published by Aircraft Publications, 370 Lexington Ave., New York City. This book sells also for $15.

Question: What is a barrel-type engine? What controls should be used when banking passes forty-five degrees—would the rudder act as an elevator and elevators as rudders? What is meant by engine cycles? What is the nacelle and cowling of a plane? What are turbo-driven supercharged engines? What is an electrically illuminated reflector-type gunsight and what are its advantages? F. F., Jr., East Orange, N. J.

Answer: A barrel-type engine is an engine having its cylinders arranged in equal distance and parallel to the main shaft, making it look like a barrel. In a turn in which a ship is banked past forty-five degrees the rudder is used instead of elevator and the elevators take the place of the rudder. Practically all aircraft engines operate on the four-cycle principle, which is: intake, compression, ignition and exhaust. A nacelle is an inclosure fastened to the wing of an airplane which streamlines the engine mounting frame. A cowling is a metal covering around an engine. The turbo-driven supercharged engine is an airplane motor whose supercharger is driven by a turbine which is operated by the exhaust gases. An electrically illuminated reflector gunsight projects the shadow of the cross hairs onto a rectangular piece of glass fastened on the wind screen in front of the pilot. Its advantages are that it can be switched off when not in use and therefore gives unobstructed vision to a pilot. It also is clearly visible when flying directly into the sun, which is not the case with the ordinary cross-hair gunsight.

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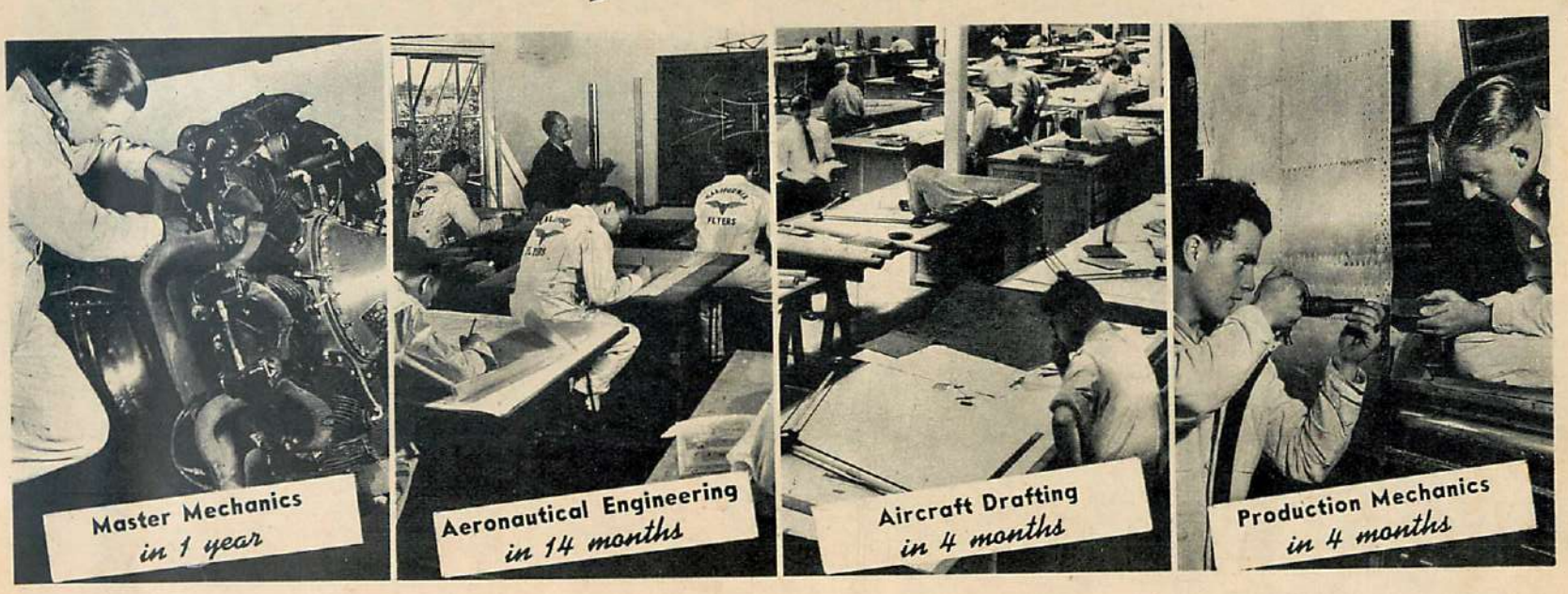

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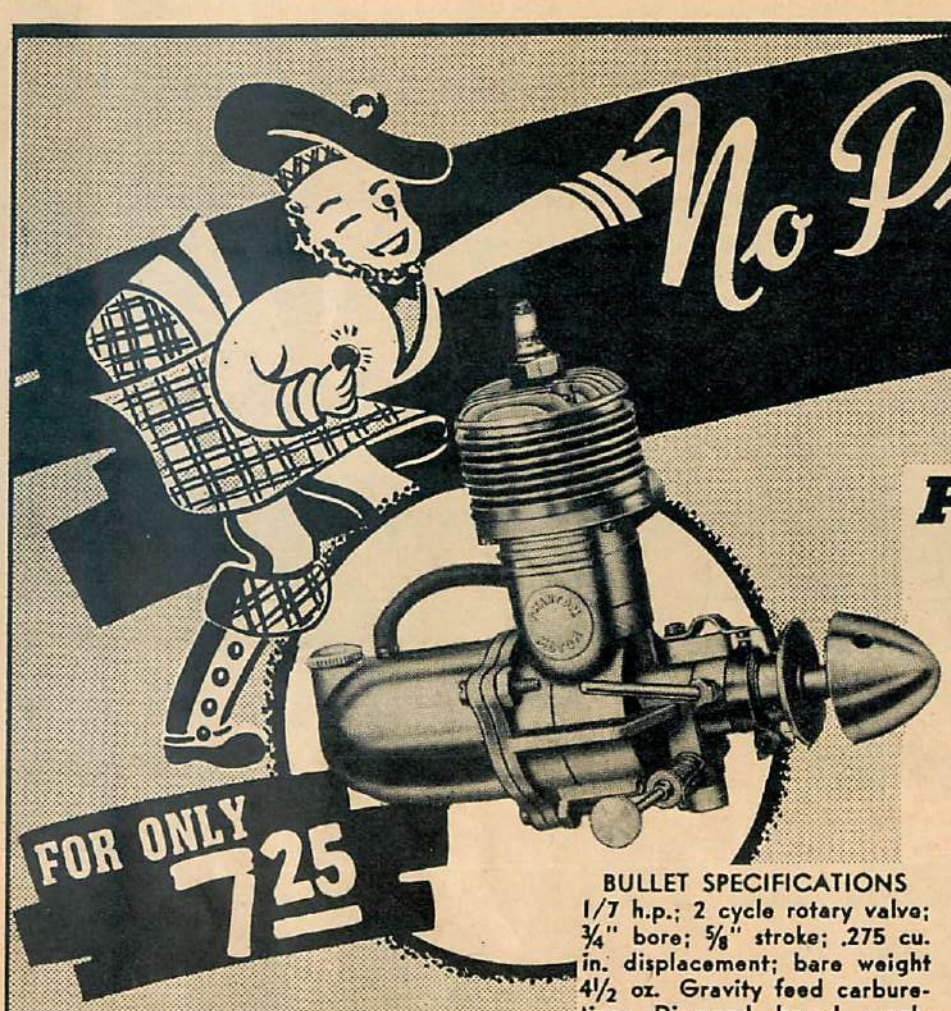

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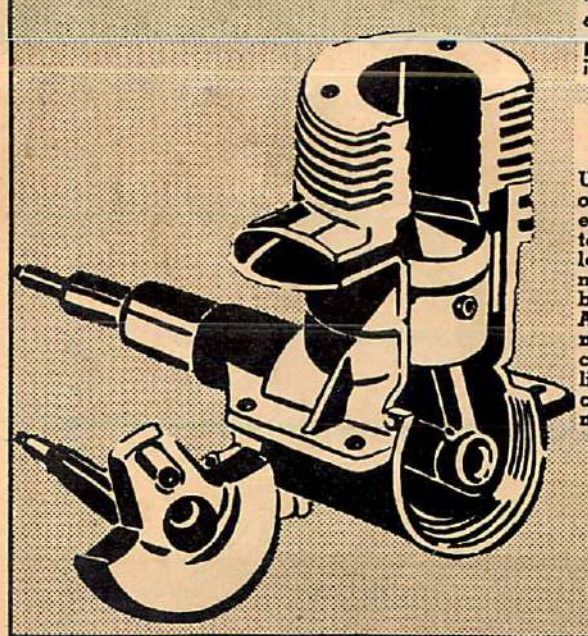

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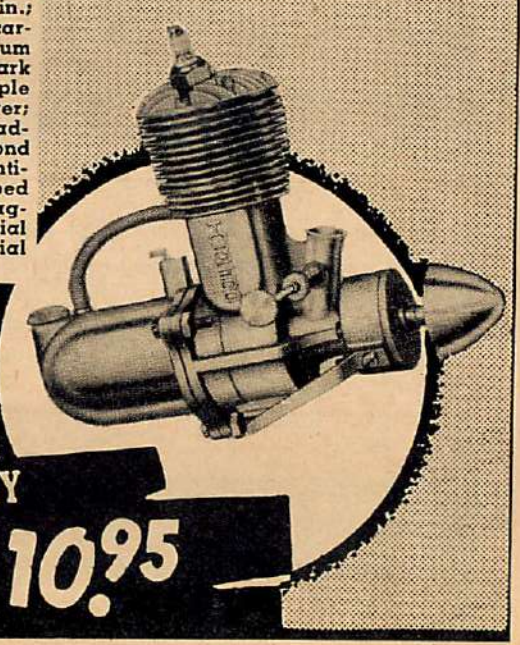

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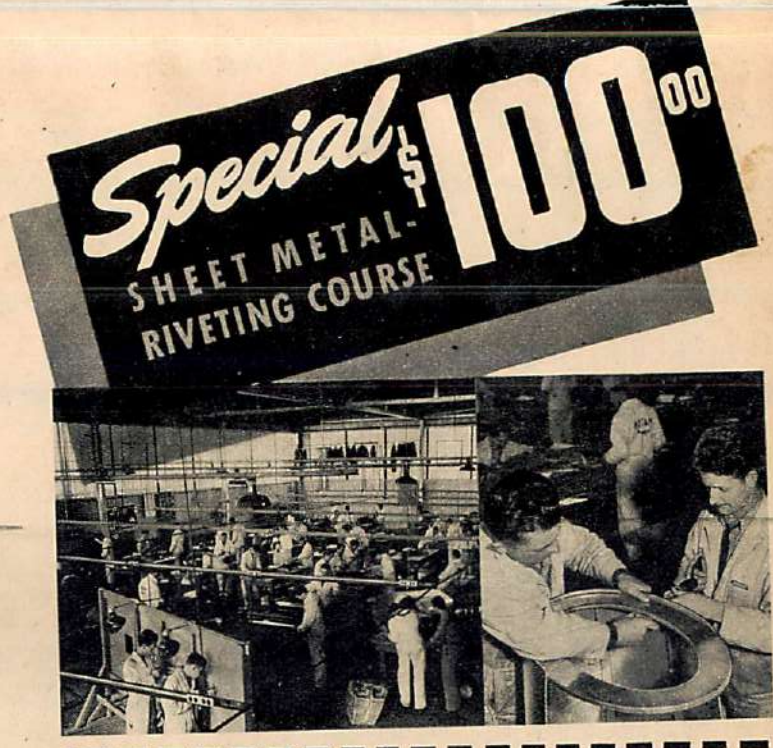

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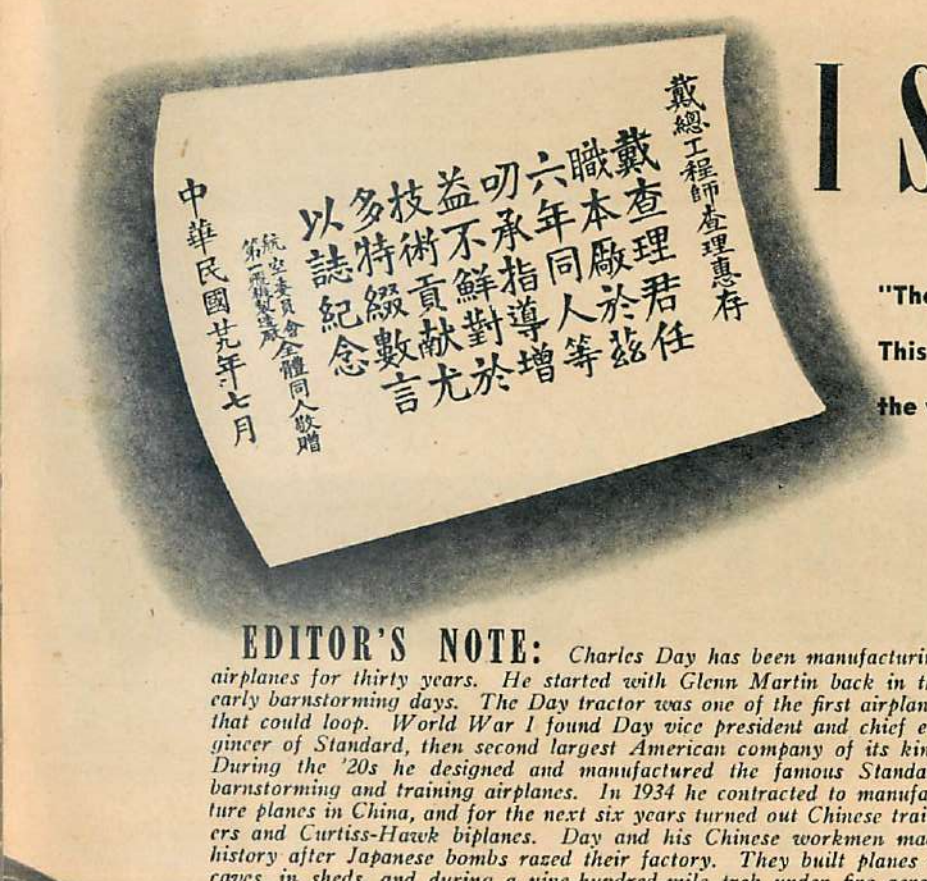


I SAW CHINA FIGHT

"The Japanese air force is dangerously underestimated in America." This man, an aircraft authority just back from six years in China, rips the veil from the Far East sky war with a dramatic, challenging report.

BY CHARLES HEALY DAY

EDITOR'S NOTE: *Charles Day has been manufacturing airplanes for thirty years. He started with Glenn Martin back in the early barnstorming days. The Day tractor was one of the first airplanes that could loop. World War I found Day vice president and chief engineer of Standard, then second largest American company of its kind. During the '20s he designed and manufactured the famous Standard barnstorming and training airplanes. In 1934 he contracted to manufacture planes in China, and for the next six years turned out Chinese trainers and Curtiss-Hawk biplanes. Day and his Chinese workmen made history after Japanese bombs razed their factory. They built planes in caves, in sheds, and during a nine-hundred-mile trek under fire across China's mountainous back country. Late in 1940 Day returned home. Now he's in Canada—troubleshooting aircraft production. How the Chinese feel about "Dai Char-lee," as they called him, is indicated by the following translation of the Chinese banner at the top of the page—a banner presented to him by the native workers at his factory:*

To Engineer Charles Day:
Charles Day, having been with this aircraft factory for the past six years, his fellow workers, in appreciation for all the knowledge he has imparted to them, especially that pertaining to technical knowledge, have caused these few words to be inscribed to express their appreciation for him, to have and to hold in fond remembrance.
Presented by the staff and workers of:
Aircraft Factory Number One,
Department of Aviation, Chinese Republic.
29th year—July (July, 1940).

DURING all the years that have been China's, no memory goes back to a time when she has presented such a united front as today, such a will to remain herself. China has been taught the drastic lesson that if she is to survive as a nation of free people she will have to go modern, to adapt herself to Western methods of warfare. This is contrary to everything in the average Chinese nature. Basically they are a peace-loving, hard-working people who ask nothing more than to be let alone.

Who will win the war? China. That is, if she is able to bring in her vital supplies and materials. China, because her millions are united as never before with the determination to drive the invader back into the sea. I have talked with the river people, the rice farmers, the shopkeepers. Indifferent in the beginning, they argued logically: "We are poor people. We cannot have less nor can we get less to eat. What difference does the war make?" But that was before they were bombed. Now they can't wait until they can get their hands on a gun.

I can tell you, and prove it, too, that the Japanese air force is dangerously underestimated in America. Quality, in planes they can put on the fighting line, is equal to ours and we don't compare when it comes to quantity. I have examined practically undamaged Japanese planes brought down by the Chinese; I have watched the Jap fighters spar with Chinese Hawks, Russian Chatos, French Dewoitines, Italian Capronis; I've been bombed thirty-five times by the Jap bombers. But, before telling my story, I'd better explain how it was that a peace-loving American manufacturer like myself got tangled in a first-class war.

In 1931-32 with my wife, Gladys, I flew around the world in a plane of my own design and construction. Of all the places we saw, China intrigued us the most. There was a fascination in its vastness, its people. We determined to see more of that strangely contradictory country. In 1934 we returned to China.

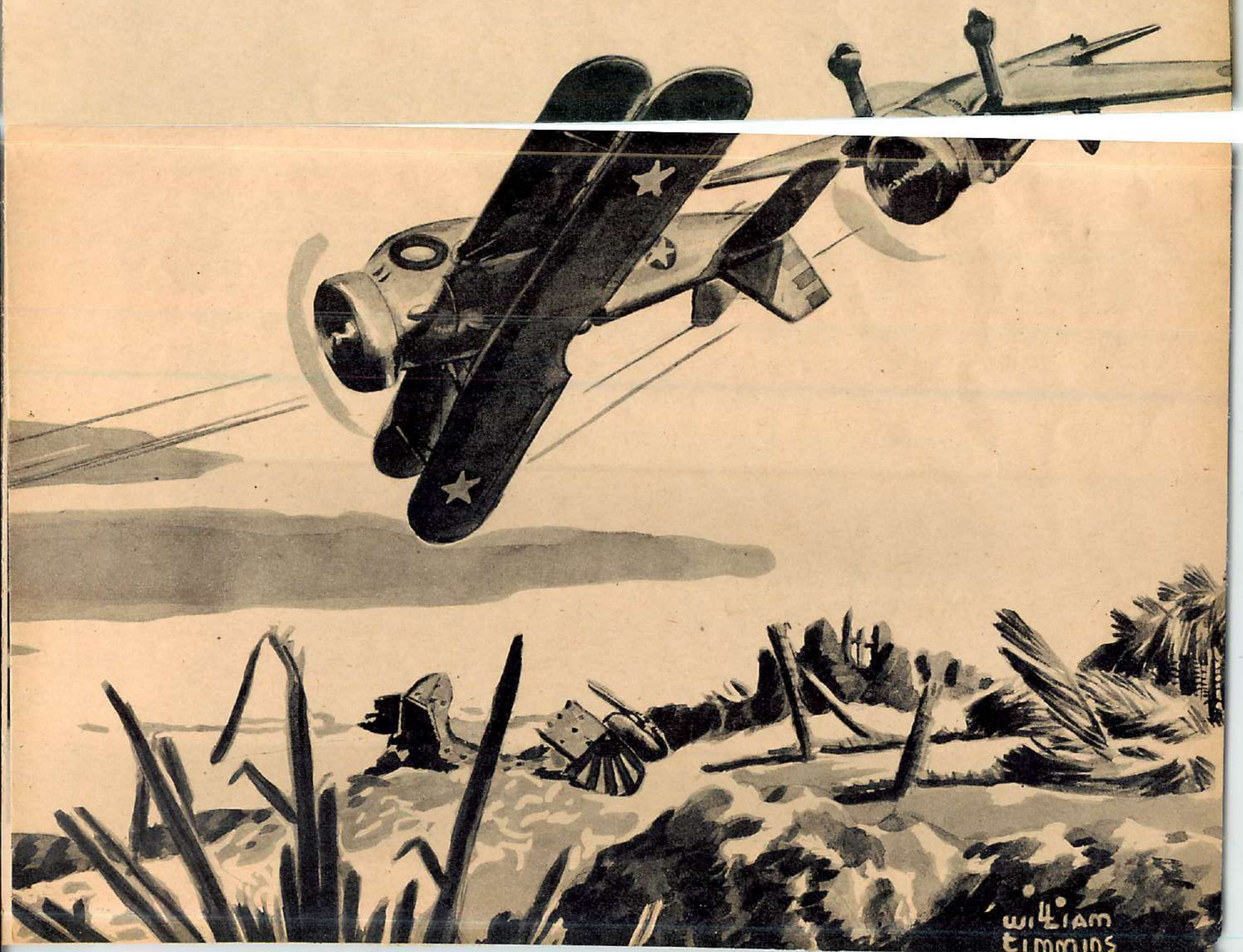
I had a contract to build airplanes for the Canton government of South China. For two years we worked peacefully at building a plant, teaching the Chinese the complex art of building warplanes, and eventually we began to turn out a basic trainer. These came off the line in increasing numbers, in spite of our having to move the factory to Canton and back again. We even turned out Curtiss Hawk biplanes (Type 3).

Then came the war with Japan. We in South China never thought the Japanese would reach our part of the country. They never would have had they relied on their army and navy, and today, for all their vaunted strength, the army controls only that part of China on which it stands. It was the Japanese air force that brought the war home to us and most of China. They brought it to us with bombs and machine guns, and I was in a position to make firsthand observations of the striking power of the Japanese air force as well as of the resistance put up by the Chinese fliers.

No comparison, however, is possible between the two forces as far as numbers are concerned. From the best estimates available from information gathered from all sources, we figured the Japanese to have around eight hundred planes, fighters and bombers, in China with the army and navy. They probably have forty-five hundred in all. I do not believe that anyone, with the possible exception of Chiang Kai-shek or Madame Chiang Kai-shek, has ever known the total number of Chinese planes in service at one time. Nevertheless, we do know that they have been pitifully outnumbered. Official figures of the Chinese government—which from personal observation I have every reason to believe—claim that eight hundred Japanese bombers and fighter planes have been destroyed since the start of this undeclared war between China and Japan. They give the Chinese losses at about one half of that number.

Shortly after hostilities broke out the largest air battle in the history of aviation, up to that time, took place at Hankow. Over fifty planes were arrayed on each side and the fight raged until what was left of the Japanese fled in the wildest disorder. The Japanese official headquarters claimed a smashing victory. I counted fourteen Japanese wrecks. Twenty-two Japanese planes had been shot down while the Chinese air force had lost eleven. Although this does not agree with the Japanese reports, it was what I saw after the fight.

The Chinese are the better pilots. That does not mean the Japs are bad fliers. Poor eyesight is their handicap. The Chinese do have a more natural instinct for flying. But their chief superiority springs from their individualism. The Japs are regimented and are not resourceful in a pinch. The Chinese are. Air fighting is of the bitterest do-or-die variety. I've seen Chinese, out of ammunition, try to ram the Jap single-seaters. Even when the Hawks dived and tried to ram the enemy, however, the newer Jap low-wings could still roll out of the way and climb or pull away almost two for one over the Hawk. One Chinese did ram a bomber and jump to safety. He apologized to the general with tears in his eyes: "I was pretty terrible today. I wasted an airplane. I had to ram him."



Chinese DC-2s couldn't pull away from cruising Jap bombers. These bombers resembled Junkers, more heavily armed. The workmanship was comparable to American equipment.

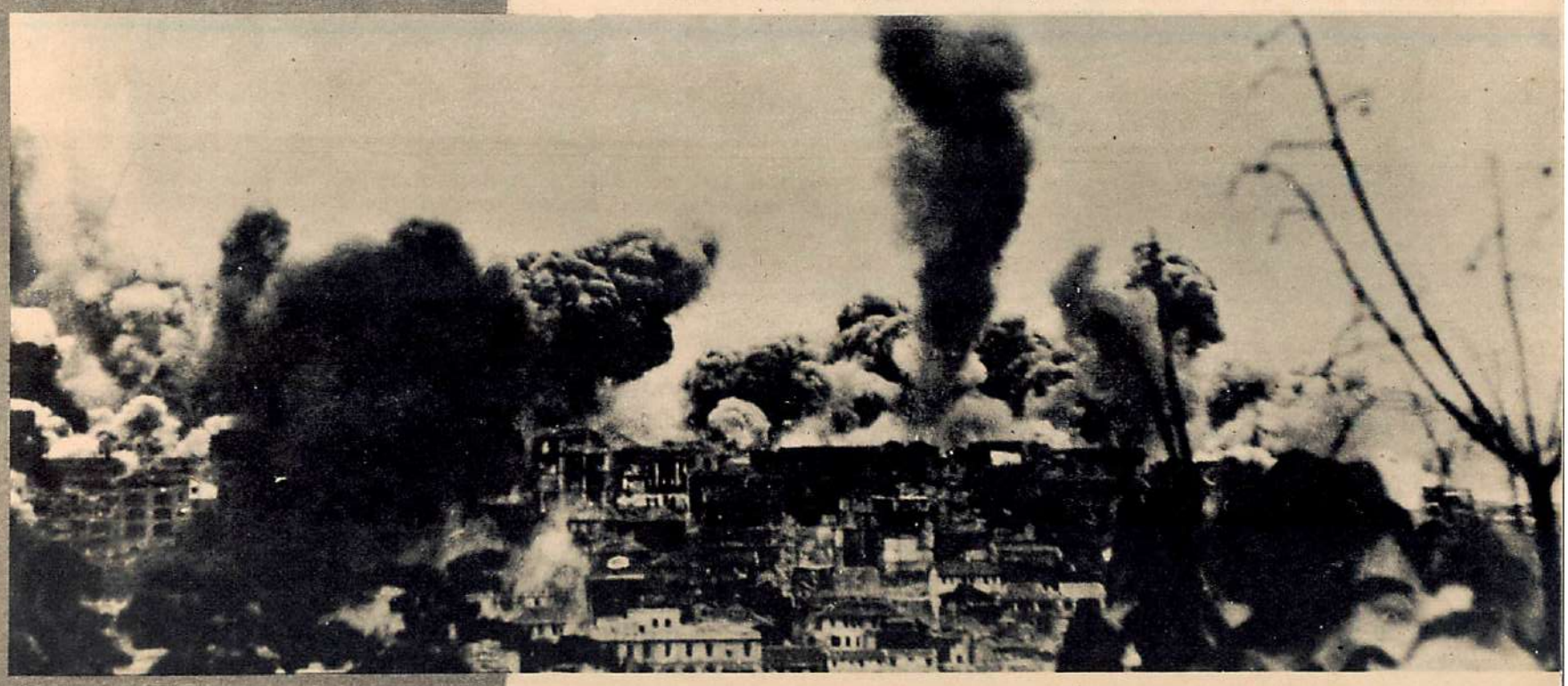
I SAW CHINA FIGHT

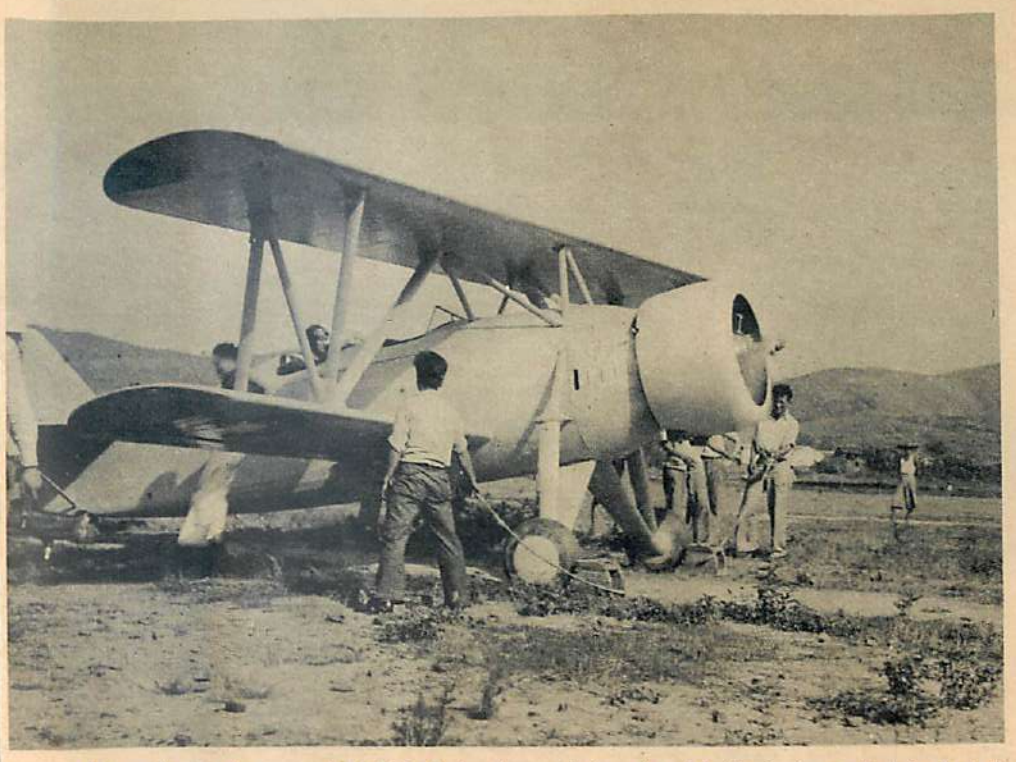
CONTINUED FROM PRECEDING PAGE

And the Chinese are as capable as their enemies in making long and difficult flights. Once they raided Tokyo, using the American Martin B-10s. Fortunately for the Japanese, they dropped nothing more lethal than leaflets. On another occasion they flew to Hankow with bimotored Russian-built bombers and bombed blazes out of the surprised and grounded Japanese squadrons. They must have destroyed hundreds of planes. Even Curtiss Hawks had their reserve belly tanks replaced by five-hundred-pound bombs.

The Jap low-wings were wicked machines. They could turn on a dime and, in fact, they reversed the old axiom of getting on your opponent's tail. Whenever a Hawk did get on their tail they'd stick their nose up and pull right away. If the Hawk followed, they'd flop over in an impossible loop of three hundred or four hundred feet and dive on the pursuer. I have never seen anything like this loop outside of China. It might be attributed to a two-foot-high fin that ran from the cockpit back to the rudder fin. Aërodynamically, Jap planes left nothing to be desired. And as to workmanship, I have examined a practically un-

Inferno in Chungking. As many as 130 bombers came over for ten days straight. One day's casualties numbered 10,000. Author's six years' observations indicate Jap air force first rate.





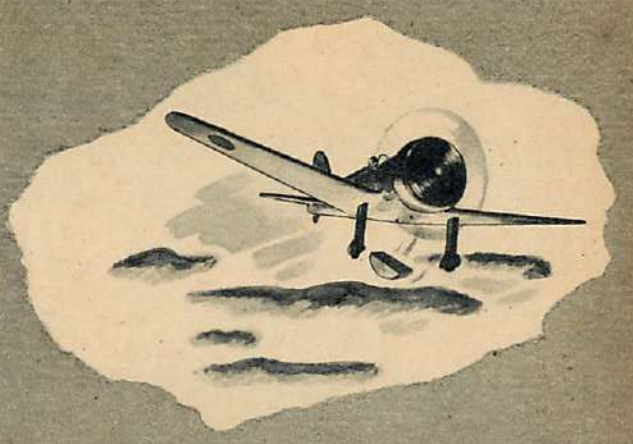
The author in the cockpit of China's first home-designed and built airplane which he tested. This was Fushin basic trainer, fastest trainer in the world at time. Turned out Hawks, too.

damaged machine brought down by the Chinese. Their craftsmanship is comparable to ours. Even the Cyclone engines, Twin-Wasps on the bombers, were beautiful and reliable copies, distinguishable from American-made motors only by their slightly heavier cylinder-head fins. We judged these fighters to have about a 315 m.p.h. top.

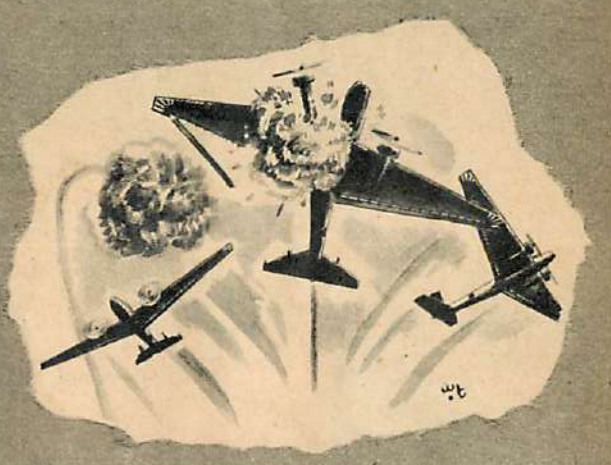
Pilots of the Chinese National Airways told me that their DC-2s were unable to pull away from cruising Jap bombers. These twin-engined machines were much like the latest Junkers, although they may have been more heavily armed. They used twin guns in the nose. Top was about 250.

Japanese bombing accuracy was terrible in the beginning. For instance, they scored just two hits in the first five raids they made on our factory, practically wrecking the city. They'd sight on the plant, coming in one at a time, and missing all the while. It was safer in the factory than in the nearby air-raid trenches. Actually, if they aimed to miss they would have destroyed the factory far sooner than they did. Of course, they turned later to formation mass bombing *(Turn to page 60)*

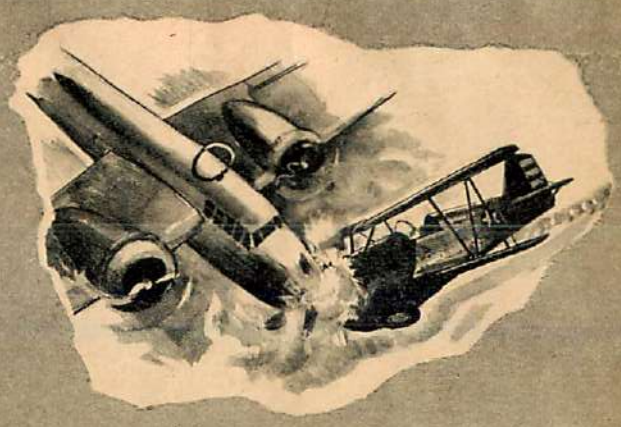
Japanese 130-pound fragmentation bombs caused terrific destruction. This was one hangar next to factory operated by author. Factory often bombed; Day went through 35 raids.



"The Japs attached sheet-metal belly tanks to their fighters for convoying. They'd drop these in a fight."



"The bombers huddled in defense, but a lucky hit touched off leader's bombs and blasted ships apart."



"One Chinese rammed a Jap bomber. He apologized to his general for wasting a good airplane."

"The Japs would circle their own fallen planes and bomb them, regardless of own men in wreckage."

To light-plane pilots who follow the water routes via seaplanes come many unexpected pleasures and picturesque scenes along the way.

Water PREFERRED

BY HOWARD HASBROOK

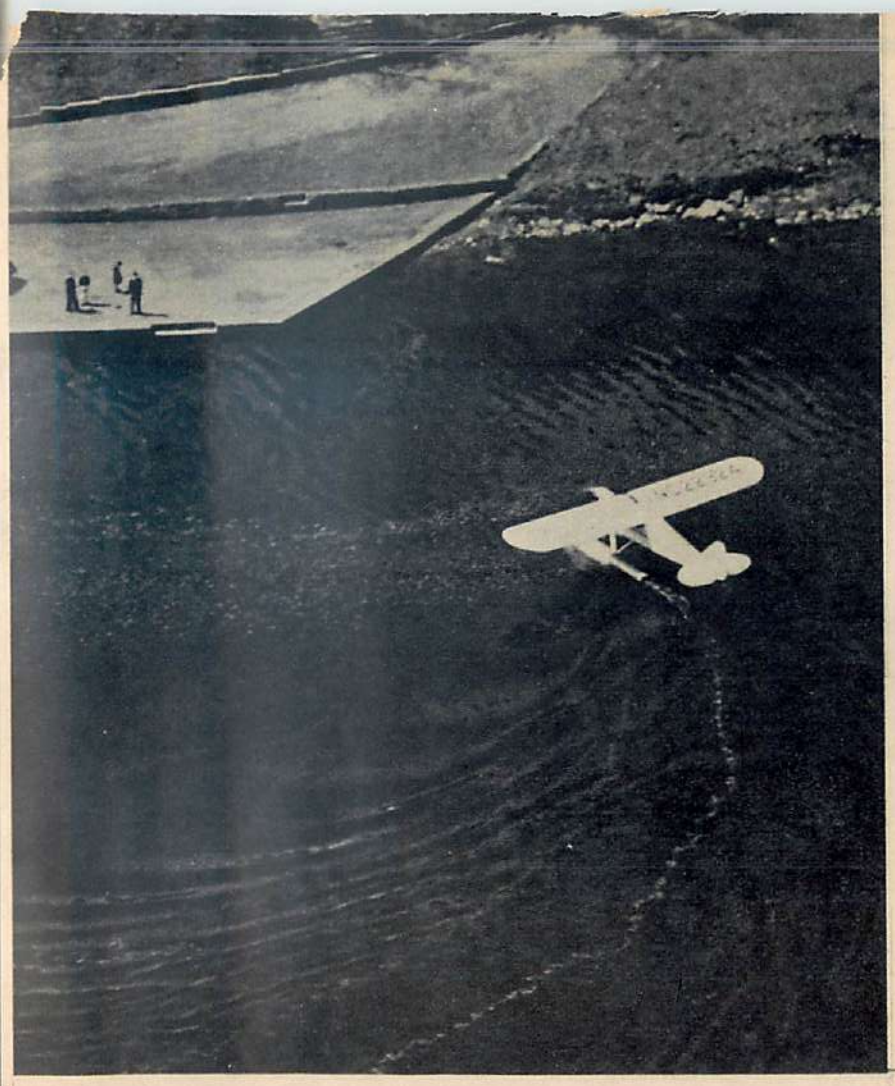
SEAPLANE flying is on the upswing! One need only consider its superiority in sport, utility and safety to realize why. As a sport, seaplane flying is a combination of two of the world's greatest—boating and flying. Most people who love boating take to seaplanes like a child to an ice-cream cone on a hot summer day. Both from a sporting and commercial angle it has the added advantage of being cleaner than landplane flying. Any person who has worn a suit of white ducks to our average ungrassed airport on a breezy day will appreciate making the acquaintance of seaplane flying.

From a viewpoint of utility, seaplanes get top rating, not only in the private but also the commercial field. You need only to look over the aëronautical sectional charts of the United States to see that our country is covered with a vast network of inland lakes and rivers and that our coastline is virtually a continuous seaplane landing space measuring over 6,000 miles in length. From this it can be easily seen that these thousands of miles of possible landing areas for seaplanes will always outnumber all the airports that now exist or can ever be built, no matter how much our government pushes its airport-building and expansion program. In Canada and Alaska it is almost impossible to operate other than seaplanes because of the lack of suitable ground areas for airports and the terrific costs associated with getting airport-construction machinery into the few suitable spots.

From our own viewpoint as a pilot we like knowing that we can use a seaplane for more than just cutting the corners of the "port" on a Sunday afternoon.

We've found that the lakes, bays, rivers and coastline of our land offer us much more chance to get to recreational centers, hunting cabins in the mountains, summer resorts, week-end parties and friends' homes and swimming parties (just take some trunks along and swim off the floats) than is offered by our too few airports scattered at random over the country. The seaplane has truly given us the chance to make use of flying as we like it—to take us where we want to go, with little restriction, in the shortest length of time.

Safety is an important factor to everyone, specially to those who fly. All the advantages that the seaplane possesses would not be enough were it not a safe mode of travel, but here it excels again even when considering forced landings on rough ground or tree-studded slopes. Many of us have been flying on wheels so long that we forget that the Wright brothers used skids instead of wheels on their early planes, as did many other designers who came after them. The floats of a seaplane act much the same as skids if it is found necessary to make a landing on ground or snow. They are constructed much the same as a boat, but light in weight, and have strong, rigid keels running the whole length of their bottoms. Due to their rugged construction, it is often possible to come through a forced landing made on extremely rough ground with no resulting damage to either the ship or the floats, unless, of course, a boulder or a stump pierces the metal skin which covers the metal framework. In making a forced landing on broken ground or into trees the floats absorb a large



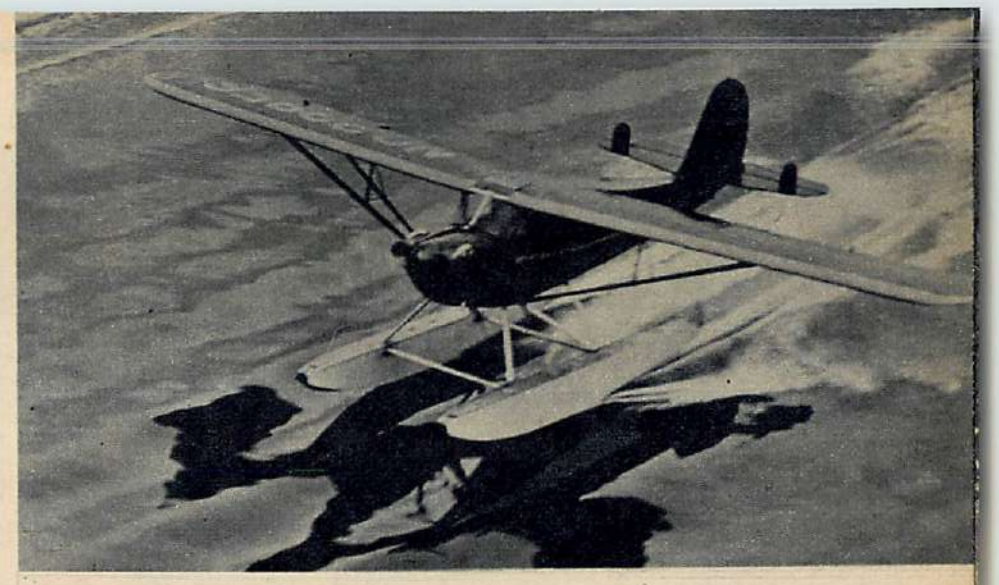
Always approach a mooring upwind, even if you have to drift past and return.

Sure, seaplane flying is fun, but it's a little different from flying that light plane with wheels. A convert to floats tells what to expect.

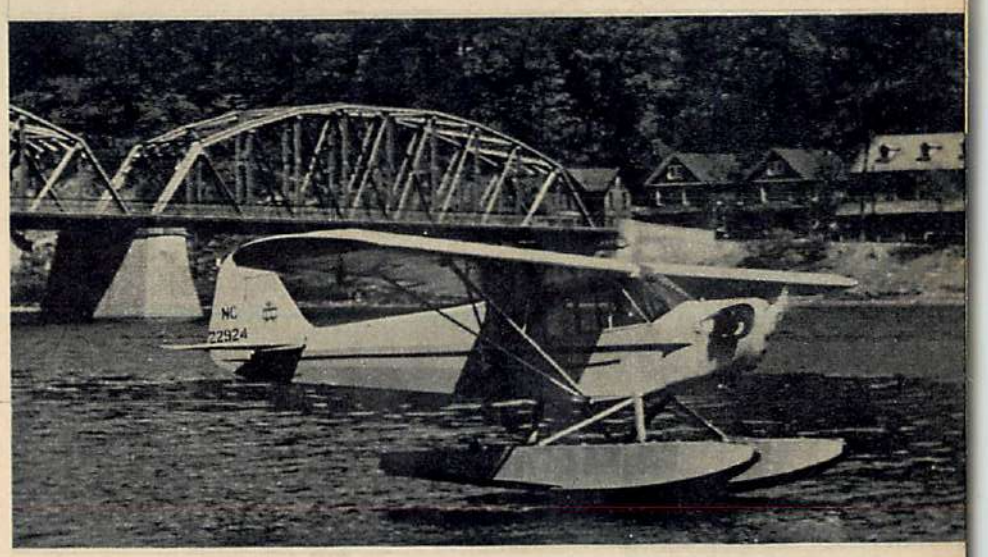
amount of the initial shock of the impact and thus reduce the amount of damage which may be suffered by the ship itself. We have heard of cases in which pilots have walked away from seaplane "spinning crashes" simply because the impact was almost totally absorbed by the floats alone.

We see only one drawback to water flying, and that is the increased initial cost of the seaplane and its equipment over that of the landplane. Corrosion proofing to safeguard against salt-water corrosion costs from seventy-five dollars up depending upon the size of ship purchased. The cost of the floats, however, is the biggest item, and will put a $600 or more hole in your pocket, this, of course, again depending upon the size of equipment needed for the ship. We feel that this added cost is well compensated for by the seaplane's many advantages.

When we originally became interested in seaplane flying after having flown landplanes for a number of years, we went to see Tony Barone, operator of the North American Flying Service located on the Hackensack River at Little Ferry, New Jersey. He had been recommended to us as one of the best seaplane instructors on the East coast and we felt that we certainly needed the best if we, in our old age, were going to be transformed into a water pilot. After wading through a large group of students who were using terms wholly unfamiliar to our ears, such as "glassy water," "steps," "heels," et cetera, we finally located Mr. Barone and, with some misgivings, asked him whether he thought he could make us into some semblance of a seaplane pilot. He checked over our log book *(Turn to page 52)*

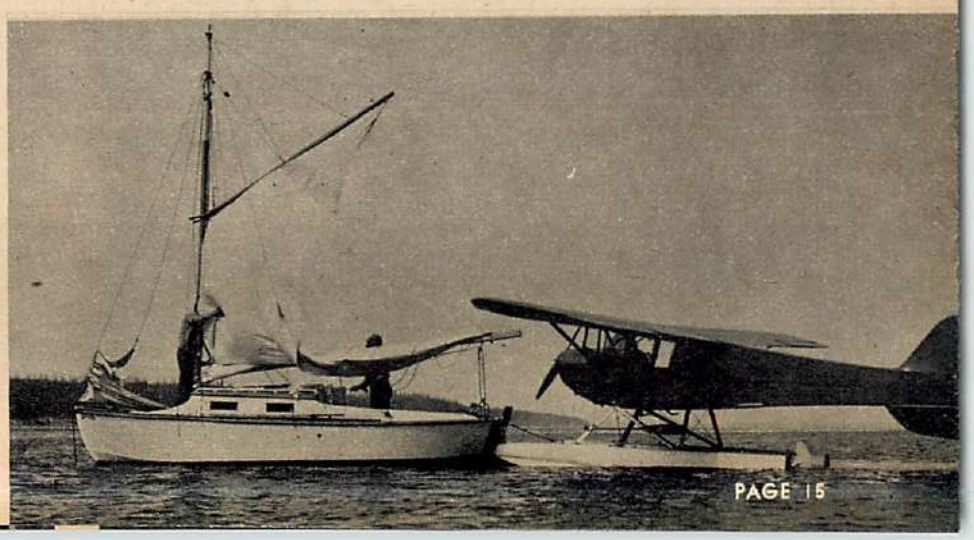


In taxiing a seaplane the stick is kept back so that the noses of the floats will not dig into the water. This Aeronca is taxiing fast on pontoon step.



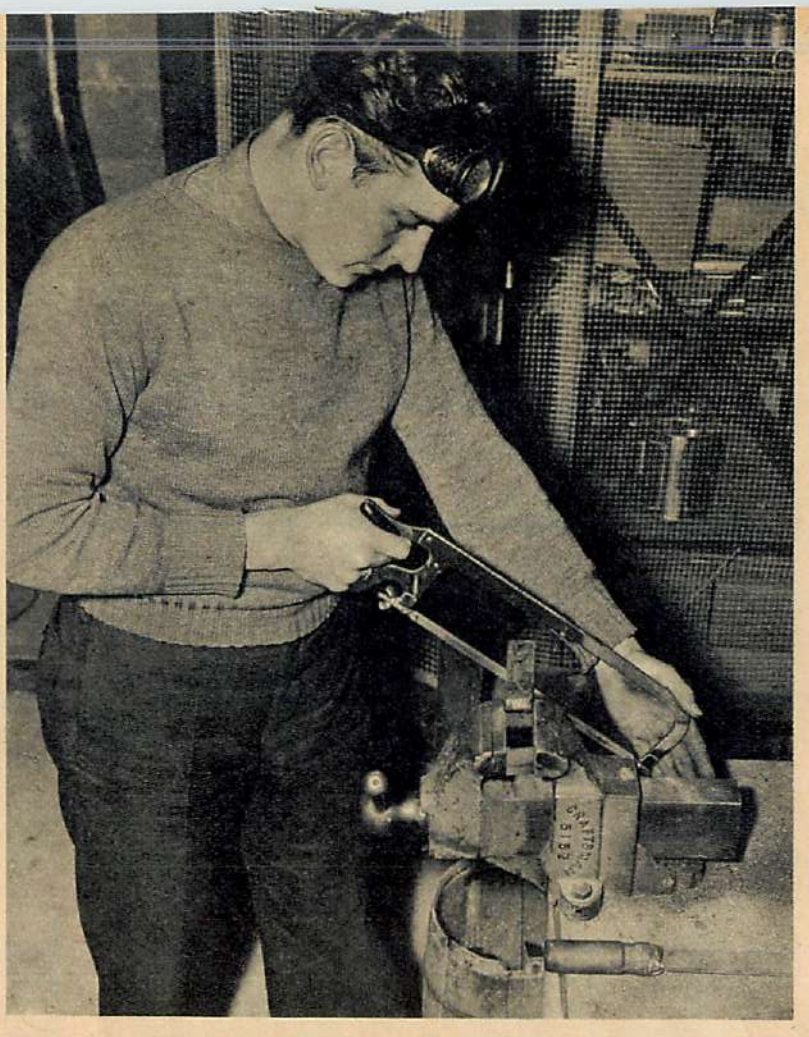
Sticky feet. Taking off from a glassy surface is difficult because of the pontoon's suction. Solution: Lift one float free and then raise the other.

Seeing is believing! You can't land a landplane on water, but you can land a seaplane on land with safety, and take off again. Al Bennett shows how in his float-equipped Piper Cub. Below—From sailing the skies to sailing the seas. This Taylorcraft seaplane pilot carries a paddle for easy approaches.



Parkinson, foreground, makes a sample weld with oxy-acetylene torch.

Passing muster. The inspector checks the sample weld for any flaws.



Proof of the pudding is the sawing. The author cuts through weld to test depth.

WELDING FOR THE FUTURE

BY JOHN C. PARKINSON

A student at a school for aviation welding describes for you the nature of his course.

JOHN C. PARKINSON; age, 22; residence, Syosset, Long Island; present occupation, private chauffeur. This is the way my entrance application read for the 360-hour evening welding course at the Faust Aircraft Sheetmetal Training School at Jericho, Long Island, N. Y. Now I'm almost finished with my course and am awaiting the day when I can pass my army or navy welding test and obtain a position with one of the nearby aircraft factories.

I live within driving distance of such rapidly expanding aircraft plants as Republic and Liberty in Farmingdale, Grumman in Bethpage, Brewster in Long Island City, Edo in College Point and Colgate-Larsen in Amityville. Many of my friends had taken courses at the Faust School and are making good wages at these plants. Welding had always interested me, and I decided that this was the branch of the aviation industry for me. Now I'm mighty glad I made the decision.

I didn't know just what to expect the first night I started school. I attend five nights a week from six o'clock to midnight, by the way. The very first thing the head instructor did was to talk to the new class in a friendly, offhand manner. It wasn't a lecture, and yet I was impressed by the seriousness of the career I had decided to enter. The instructor explained what was expected of us while in school, impressed upon us the fact that safety rules must be obeyed, explained the care and use of our tools, and made us feel at home from the start.

Shop procedure at the school is identical to *(Turn to page 49)*

FLYING FLEET

BY JAMES L. H. PECK

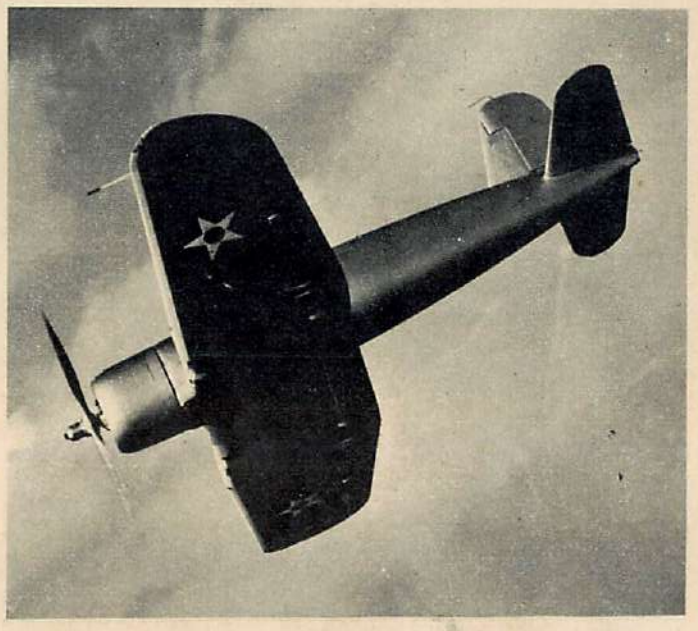
Do you know all the types in our naval air arm, their duties, the latest ships?

THE United States navy, as our first line of defense, has a big job to do. It is confronted with the immediate problem of maintaining strategic security and control of a huge area which is bounded, roughly, on the north by the arctic circle, on the west by the international date line, on the south by the equator, and on the east by the 40th meridian which splits Greenland. Strict observance of the Monroe Doctrine would extend the boundary to the 40th parallel which lies some five hundred miles to the south of Buenos Aires. Sans the airplane, not even our two-ocean, three-fleet navy and that of Great Britain could patrol these millions of square miles, much less defend the area.

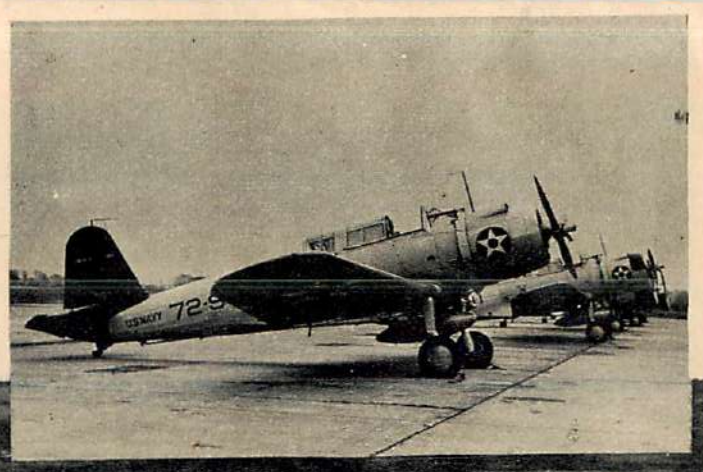
Fortunately, the naval air service—for many years the finest naval air arm in all the world, and it will be the largest arm with the accretion of the fifteen thousand aircraft and additional pilots—makes this great defense task easier. Our aërial fleet is assigned two roles: fleet operations and coastal operations, the purposes of which are self-evident. Marine corps aviation supplements these NAS operations.

During fleet operations, NAS planes, for the most part, roost aboard the aircraft carriers. Seaplanes, of the scout-observation type, are borne aboard battleships and cruisers. Patrol bombers operate from shore bases and, when far at sea, have their wants attended to by "mother ships," or tenders. The carriers *Lexington* and *Saratoga*, two of the navy's largest, fastest vessels, have more than two acres of deck area available for the operation of the four squadron types carried aboard. On completion of the new expansion program, the navy will have twelve carriers afloat.

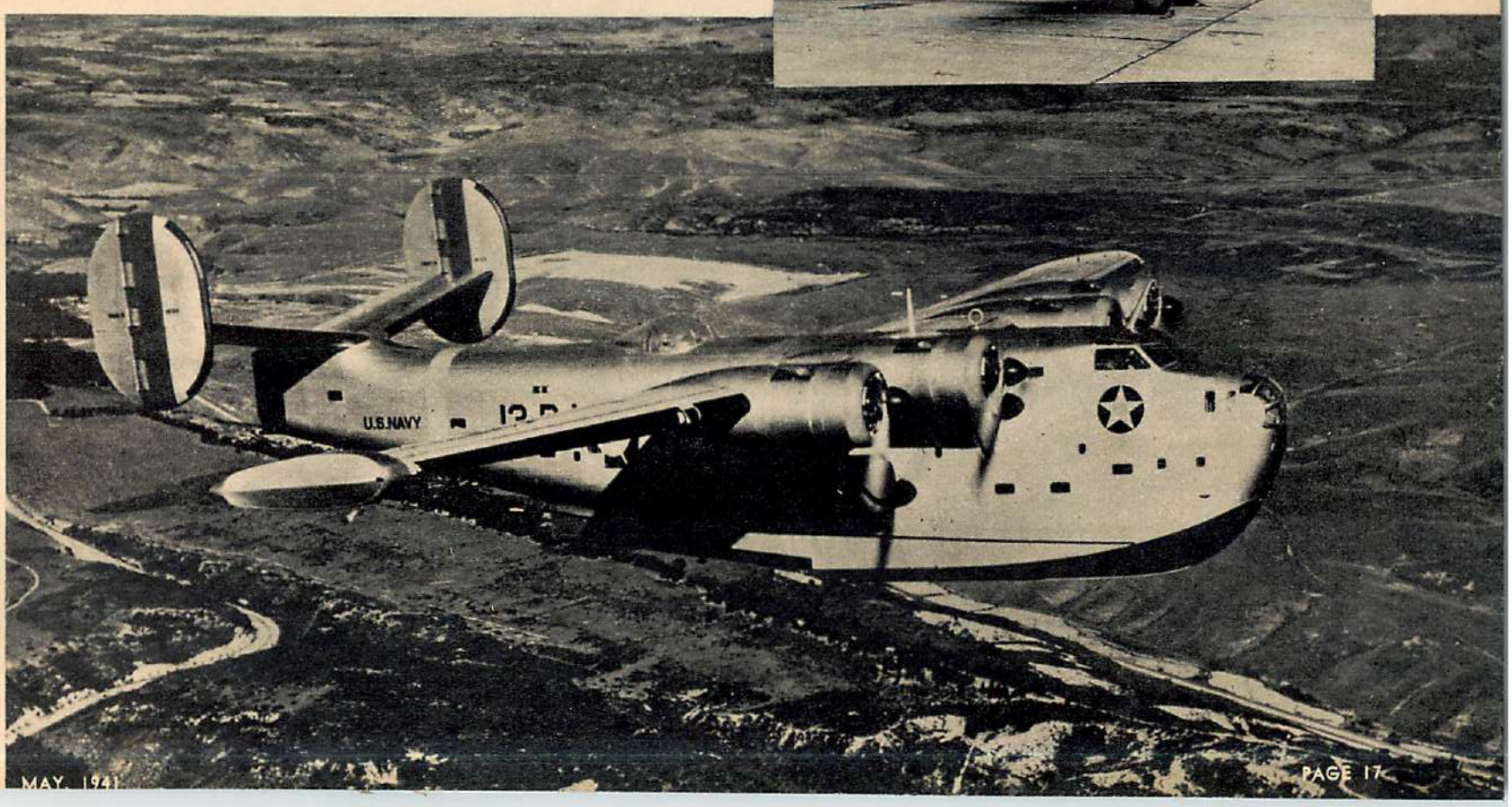
Tactically, the aircraft carrier's function is the transportation and delivery of fire power, or bombardment. Newest and largest of these "deliverers" are the Grumman TBF-1 torpedo bombers, whose outer wing panels fold upward to facilitate stowage on the crowded decks. These craft, and the older, better-known Douglas TBD-1 three-seater torpedo bombers each carry a two-thousand-pound torp, or four five-hundred-pound demolition bombs. Pilots of the torpedo bombing squadrons have one of the toughest jobs imaginable. They fly just above the tops of the *(Turn to page 55)*



Something to be looked up to. This navy Vought-Sikorsky XF4U-1 has a proven speed of over 400 with its 2,000 h.p. double Wasp. Below—Another ship from the same plant, the SB2U-2. This scout-bomber bears the new nose-star insignia of the neutrality patrol.



PBY's big brother. The Consolidated PB2Y-2, the largest and most powerful navy plane. Note the nose, tail, and fuselage machine-gun blisters.



BATTLE TACTICS

GROUP ATTACK ON UNESCORTED BOMBERS

SHOWING CONCERTED FLIGHT ATTACK ON SINGLE BOMBER

THE LIFE OF A FIGHTING PILOT DEPENDS UPON HIS ABILITY TO UNDERSTAND AND USE MODERN BATTLE TACTICS. NEW ARMAMENT, DESIGNS, SPEEDS AND CEILINGS ALL CHANGE AIR STRATEGY. HERE ARE EXAMPLES.

CANNON ATTACK ON BOMBER

Pontoon punishment. Landing these catapult-launched seaplanes calls for the very highest degree of flying skill and absolutely perfect timing.

SHELL SPOTTERS

BY JOHN R. HOYT

As the naval fight rages below, the SOC's job is to radio firing directions back to the battleship gun crews.

THE pilot braced himself, waiting for the powder to explode. There would be a terrific, sudden acceleration that might jerk his hand off the stick, so he placed his elbow firmly against his thigh. Then, because the throttle might snap shut, cutting off the power and allowing the plane to crash into the sea, he put his fingers around both the throttle and the entire throttle quadrant, locking it in forward position.

Beneath his plane the cruiser rolled as a blue, foam-topped roller hit the bow. Amidships, between the stacks, the sixty-foot steel catapult rolled with the ship, often pointing the nose of the plane directly at the briny deep. Should the catapult be fired at such a moment, plane, pilot and observer would be fired to the bottom of the Pacific.

The engine was revving up full power, the manifold pressure showing over thirty-five inches of mercury. The plane quivered, the pilot braced his head against the crash pad, knowing that the starting jerk might break his neck if his head was held relaxed. Glancing down at the deck, he could see the catapult officer holding his hand up with fingers crossed: "Stand by!"

Mentally, the pilot crossed his fingers, too. The ship was headed into the wind, which meant they would shoot him into the air at about thirty degrees out of the wind. The seconds ticked by and he waited for the powder to be fired, knowing that in sixty short feet he would be traveling at sixty to sixty-seven miles an hour. He watched the side of the ship roll up, up, then roll slowly down—hesitate a second—then start to come up. And on the uproll it happened.

With a jerk the SOC started down the track, its pontoon resting on the cradle. Faster, faster, until the objects all around were blurred with speed, and the pilot felt his body being "left behind" with the intense acceleration. The plane reached the end of the track, where the plungers stopped the cradle, allowing the plane to slide swiftly off. The nose dropped, the whirling propeller bit into the air and the powerful 550-horsepower Wasp engine dished out the horses that pulled the scouting plane into the air. With a backward tug on the stick the pilot checked the fall and eased the SOC upward, banking into the wind and gaining air speed every second.

Far off on the horizon he had a rendezvous with the enemy, a battleship of 35,000 tons, too far away for the cruiser's spotter to see. But from an altitude of 5,000 feet he could spot the splashes, marking each salvo and radioing the information back to the cruiser by dots and dashes, or, if the interference was light enough, by voice.

Climbing steadily, the silver-winged SOC roared toward the broadening horizon. Behind, the friendly cruisers left foamy, spreading wakes as they boiled through the water. Soon the enemy would open fire on them, but friendly aircraft would see to it that the enemy's eyes—his own scouts—were shot down.

How long it would be before enemy pursuits spotted him, the pilot didn't know. Let that wait. Right now his attention was focused upon the slowly moving dark blob on the horizon that was an enemy battle line. A battleship is hard to distinguish from a cruiser or light cruiser until you have the essentially different lines memorized. Cruisers, as a rule, have a length-width ratio of six to one, while a battleship is wider, being only four or three to one.

From 5,000 feet the pilot looked down. The SOC was trimmed, cruising at less than half throttle to conserve the 170 gallons of gas: there must be plenty to fly on if the cruiser became too occupied with the battle to take a plane aboard. As the pilot looked down at the enemy battlewagon *(Turn to page 50)*

TOURING TEST BOARD

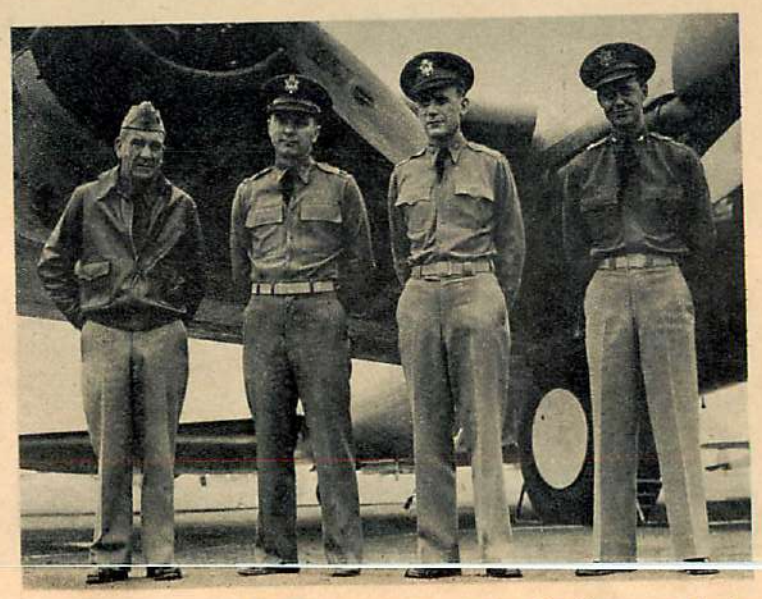
BY LIEUT. FRANK KURTZ

They fly right to your doorstep, this board which examines applicants for air corps service. A member tells how it works.

THE pilot looked over with a nod and the familiar "O. K. for No. 3, Frank." I put the fire extinguisher control to No. 3, pumped the red-handled wobble pump, threw the starter switch to "mesh," and No. 3 engine came in. Then the process was repeated while No. 4 staccatoed in with a slight vibration. The engines of the big Flying Fortress breathed easily as she rolled around the last turn onto the runway, a canal of black macadam outlined by two rows of white flush lights. It was as though a few short, easy breaths before the "sprint" was the way Nos. 1, 2, 3 and 4 had it figured out. Cockpit lights were dimmed as Pilot Jim Connally pushed the throttles forward and we leaned into the take-off with all four engines growling into the night.

Another nod and I lock the throttles and throw an electric switch to lift the landing gear, all the while keeping my eyes glued on the instruments. Now the air speed reads 130 miles per hour as the red boundary markers pass below. Check lists and all have long since been put away and the night mission has become routine. As we climb to altitude, my gaze turns westward to that big whitecap of lights—Los Angeles. I can't help recalling the night back in 1932 when Kenny Gardner came running into the Sigma Chi House, waving a telegram and throwing back flips all over the furniture. He had just received his appointment to Randolph Field. We were all proud and happy for Kenny, but I suppose my feelings went a little deeper. I had started him out flying and was instrumental in his decision to try for an appointment to Randolph.

Getting an appointment in those days to Randolph Field, the air corps training center, was to infer that *(Turn to page 58)*



The board in person: L. to R., Major Thomas W. Blackburn, president Captains S. V. Guzak and E. L. Bergquist, flight surgeons; Lieutenant Kurtz.

It's results that count, and here we have some excellent ones. The cadets selected by the traveling board number amongst these at Randolph.

GLIDER

A SOLID overcast covers the night skies high above a military airdrome. Huge hangar doors roll silently back on their well-oiled tracks as shadowlike ground crews hitch small electrically operated tractors to strange-looking flying craft leaning crazily on one wing with the other pointing high into the air. The whole scene is weirdly illuminated by blue blackout lights. The crews pick up a wing of each of the machines and level them out, the tractors start moving and the ships roll on their single landing wheel out of the hangar and onto the runway. Three twin-engined low-wing bombers are already poised there, their motors silent but ready to spring into life at the first command. The tractors tow their charges to within five or six hundred feet behind the bombers and place them in a fanwise, staggered manner. Nine in all. These strange ships are troop-carrying gliders.

With a wing spread of eighty feet and a fuselage thirty-seven feet long, they accommodate ten fully armed soldiers, each man carrying an automatic rifle, ammunition, hand grenades, one .30 machine gun, and rations sufficient to last forty-eight hours. In the nose of each glider, another easily demountable machine gun is located. The crews, working hurriedly, drag out a number of steel cables with a ring and a set of telephone jacks at either end. One ring is slipped into the release hook on the nose of the glider, the jack plugged in, and the ring on the other end, together with a jack, are connected to the towing

Silently they drift down from the night skies, each ship loaded with ten men. Here's an expert's visualization of the motorless-plane invasion threat.

TROOPSHIPS

BY ALEXIS DAWYDOFF

device on the bomber; in this manner three motorless troopships are attached to each tow plane. When all nine ships are ready, the crew chief reports to the commanding officer, and orders are given to start the engines of the bombers. Six engines come to life. A whistle blows in the hangar. Ninety soldiers, all of them slight of stature, the heaviest weighing not over 140 pounds, rise from their seats as an officer steps out from the hangar office.

Eighteen of the ninety men are sergeants wearing a "three gull" insignia on their left sleeves. They are the pilots of the glider troopships. Each ship carries two pilots and eight soldiers. The moment the glider is landed, the pilots are part of the contingent and its leaders. The officer addresses the men and explains the tactical problem ahead. They are to be landed some forty miles behind the enemy lines, blow up the bridges and railroads and disable highways in order to prevent the enemy from bringing up reinforcements for the forthcoming mass attack. They are to terrorize the population of the area they land in and give a general impression that their force is ten times bigger than it really is. The rapid-firing rifles, hand grenades and machine guns will take care of that. If the mission is a success and the territory is taken, some of them might get back. Most likely it will be a rather small percent.

Having finished talking to the men, the officer calls out the eighteen pilots and gives them maps of the territory they are to land the troop gliders in. The wind direction and meteorological conditions are indicated on these maps. The gliders are to be released some forty miles from the objective at an altitude of twelve thousand feet. The approach will be made from a direction which will confuse the enemy as to the purpose. The pilots of the tow planes are to give the order to release through the Simmons intercommunicating phones to the pilots of the gliders. Having received their instructions, the eighteen pilots fall in with their men, a whistle blows, the soldiers separate into nine groups, pick up their gear and march out of the blue-lit hangars into the gloom of the night toward the ships. A man is standing by the wing of each glider, holding it level by means of a special holding device. On the starboard side of each glider, four doors are open; the two pilots enter first, followed by the soldiers. All gear is stowed in such manner that it can be easily reached the minute the ship touches the ground, for lost time may mean a lost objective.

As soon as number one troop train is all set, the chief ground-crew man waves his blue flashlight three times. The pilot of the center glider flips the switch on his navigation lights and the wing lights of the other two gliders flicker in response that all is ready. Then into his intercommunication phone he notifies the tow-plane pilots that all is set. The bomber pilot takes a last check on his instrument, his hand advances the throttles, and he and his copilot exchange a nod. Slowly the bomber picks up speed and rumbles tail high down the runway. Some five hundred feet behind the three huge gliders, painted a dull, nonreflecting black, follow an awkward path for a few hundred feet, rolling on their single wheel, each of them pilots keeping a wary eye on the next, ruddering away from his neighbor.

Then the three gliders are off the ground, and the pilots, acting from long practice and working like a synchronized machine, let them dive slightly, in order to put slack in the cables and allow the bomber to pick up speed. The bomber pilot, feeling the drag decrease, lets it ride for a fraction of a second, hugging the runway, and then, with a slight back pressure on the yoke, takes his ship into the air in a gradual climb. The three gliders ride silently behind the tow plane and slightly above it. It's a nerve-racking business for the glider pilots. They have to strain their eyes to see the tow plane in order to keep above it and avoid the slipstream of the two 1,100-horsepower engines. Only by the blue flames of the exhausts can they approximate their position in relation- *(Turn to page 46)*

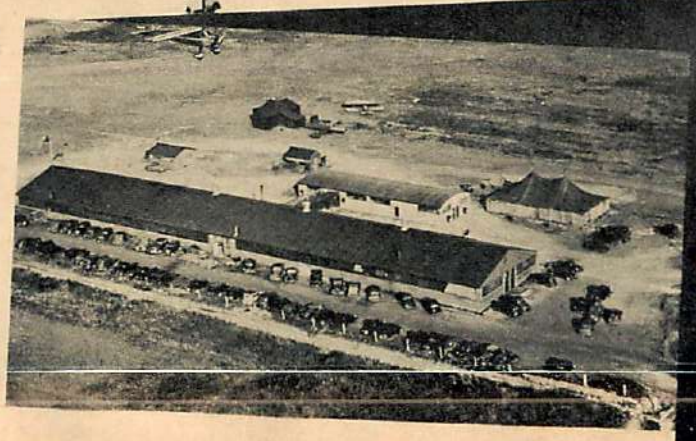
TAYLORCRAFT ALBUM

C. G. Taylor originated the light plane. Today his plant in Ohio is the industry's latest.

First of a long line. The original Taylor Cub No. 1 with 40 h.p. Salmson (French) engine. C. G. Taylor on left.

First Cub's birthplace. Here in old factory at Bradford, Pa., fire-razed in 1937, the long line of Taylor ships began.

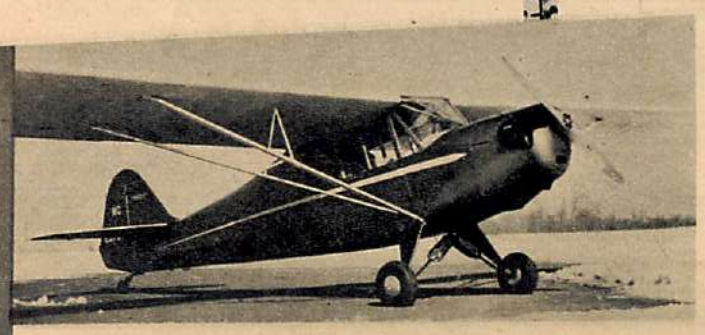
And now the first Taylorcraft. Built at Butler, Pa., this ship, with a 40 h.p. engine, marked further progress.



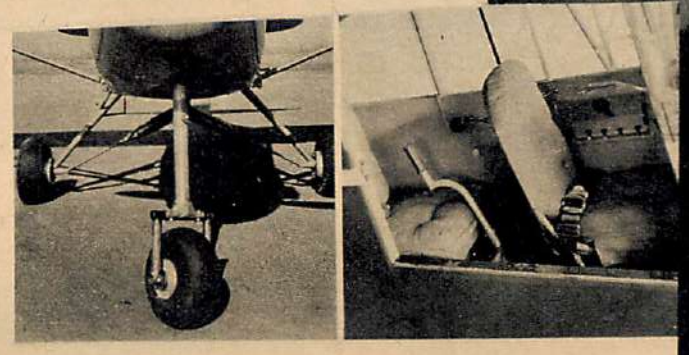
The well-known Taylorcraft factory at Alliance, O., where for many years the Taylorcrafts were developed and built.

Taylorcraft up to date, and "C. G." himself. This newest and smartest Taylorcraft is the 65 h.p. Duo-Tone De Luxe.

Product of success. This new quarter-million-dollar factory was demanded by growing popularity of Taylorcraft ships.



Taylorcraft Tandem. Designed particularly for use in CPTP programs, new tandem trainer has excellent flying and training characteristics. Engine, 65 h.p.; range, 300 mi.



Taylorcraft tricycle. The new tandem trainer is the first light plane to be offered with either standard or tricycle landing gear. Right, the roomy interior of the new trainer.

Model. Leonard Bonney holds aloft gull from which he designed plane.

TYPICAL WING CONTOUR OF A BIRD

WING CONTOUR OF AN ALBATROSS

TYPICAL AIRFOIL SECTION

Sometimes our designers copied too closely, but they're still gleaning valuable flying tricks from the first citizens of the air.

THEY LEARNED FROM THE BIRDS

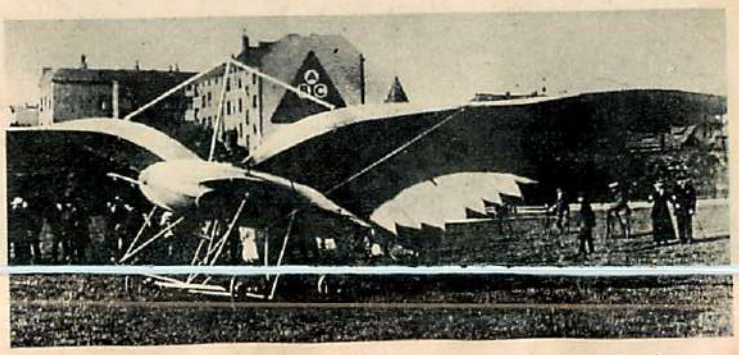
BY GEORGE H. TWENEY

BIRDS, and even animals, were able to fly many years before that most awkward of all animals, man, had even begun to toy with the idea of free flight through the atmosphere. For many years he stumbled around with a few known but uncorroborated facts, and vainly tried to piece the information together so that he could fly. Then came the idea—all at once, as it were, and just a few short years ago.

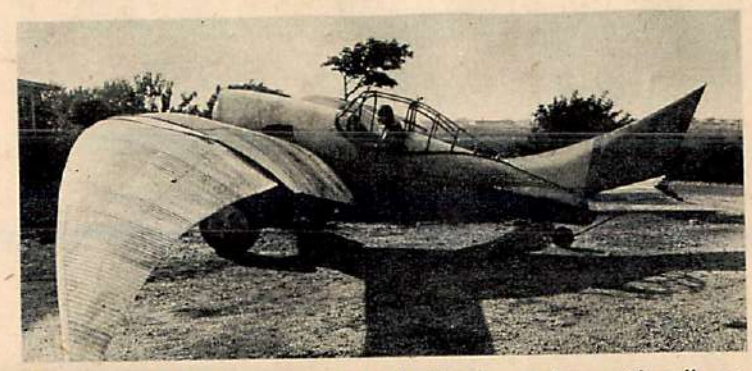
But in spite of the airplane's progress since then, aviation is yet in its infancy, and a lot can still be learned from the birds.

Our gliders have reached a fairly high point of perfection, and yet the sea gull still remains one of the undisputed best soarers. I have seen sea gulls do slope and crest soaring on the shores of Lake Michigan, and in a high-performance sailplane myself, have been unable to find an uprising air current when a gull soaring within twenty feet of my wing tip would suddenly start to climb without the least bit of effort. Obviously he had found a favorable current, while I was still frantically looking for one. While doing some Sunday-afternoon flying in light planes, I have noticed gulls at altitudes as high as fifteen hundred to two thousand feet, and have followed their course for periods as long as half an hour without seeing them flap their wings once.

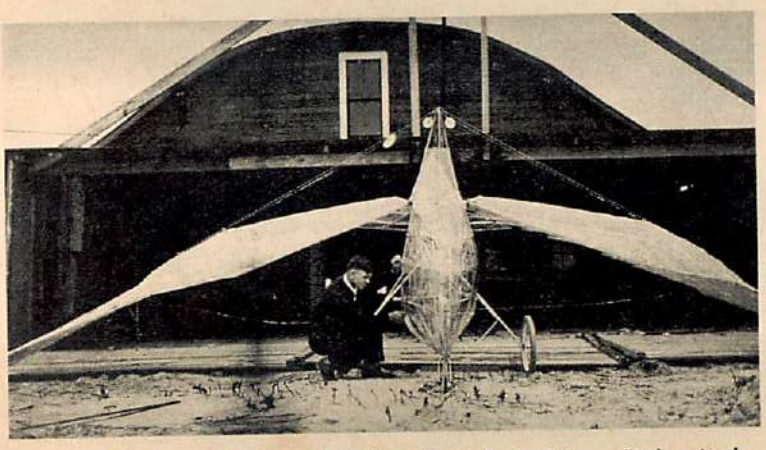
Studies of natural bird flight provide many *(Turn to page 46)*



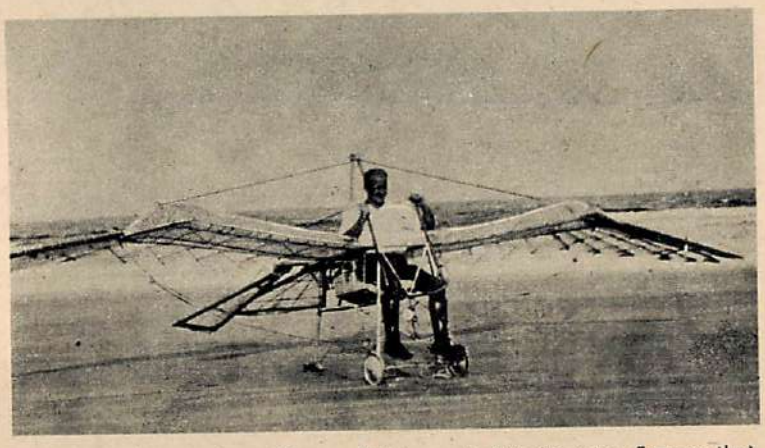
This German ornithopter designed some years ago was closely patterned after a bird, although no flight was made. Note wing "feathers."



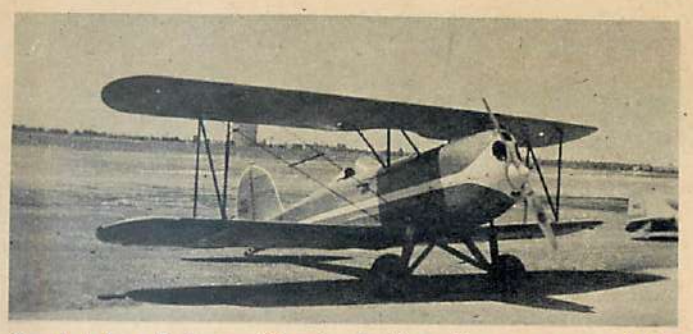
The Bonney Gull, whose inventor and pilot shown above with gull was killed on the initial flight. The engine is unattached in this photo.



This ornithopter at a Florida beach at least looks like a bird poised for flight. Note very thick camber of the wing and flapping cables.



Still another version. George White, seated in his wing flapper that also was closely modeled after bird anatomy. Wings flapped by pilot.



Great Lakes Trainer. This nice-looking ship was snapped by loyal Adventurer Herman Marver of Huntingdon Station, N. Y.

Flying observatory. This North American O-47A observation ship was photographed by Member J. L. Campbell of Memphis, Tenn.

Undercover stuff. This Boeing B-17B flying fortress was taken by Hal Whitaker, Air Adventurer from way out West in Seattle.

Photo by Robert Taylor, Air Adventurer, not the movie star. It's a Lockheed 12. Member Robert Taylor lives in Englewood, Col.

Actual size of your Air Adventurers pin.

(MEMBERSHIP COUPON)

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

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

Please enroll me as a member of AIR ADVENTURERS and send me my certificate and badge. I inclose ten cents to cover postage and handling. (Please **print** name and address.)

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

Address.....

.....

☐ Check here if interested in model building.

A club for all those interested in aviation.

GREETINGS, Air Adventurers!

Here's a line we received today from M. R. Cole of Madison, Ind. It has a swell little story inside it and we're glad to add Mr. Cole to our list of friends and members. He says: "Have been interested in aviation since 1910 when I built my own plane. I was my own instructor and I have a lot of photos to prove it. Those days were really interesting and some fine records were put up. Bud Mars, with a Curtiss plane, got off against a stiff wind from a standing start in sixty-seven feet. All he had was a forty-horsepower engine, too. The plane was a biplane and most of it was made of bamboo, spruce, bicycle wheels, turnbuckles and piano-wire cable. Those little old biplanes would bounce around in a bad wind like a flea on a freckled girl's neck."

Maybe Mr. Cole had a lot of fun in those days, but so did we. We remember getting a flight in an old Bleriot at a very tender age from the racetrack at Olympic Park in Newark. The pilot tested the motor by tying the plane to a large spring balance which was in turn bound to a fence post. Then he got in, ran the motor at top speed and checked how much the darned thing pulled to make sure it was in flying shape for the day. The flight, by the way, wound up in a nearby apple tree. Guess the spring-balance test was not so good. Still, you have to start somewhere.

"Guess you have about forgotten me," writes Robert E. Johnston of Ancon, Canal Zone, "and I don't blame you. However, here in the Canal Zone we are not allowed to take pictures of army or navy planes. I have taken some new pictures of a Taylorcraft down here. Hope you like them." Well, we know what it is to get pictures down at Panama, but the shots Bob did send us are swell. That's a darned good camera he has and he knows picture values. Thanks a lot, but don't get yourself slammed in the clink down there, Robert.

We have picked up a new member in Joseph E. Sawyer of Flushing, N. Y., who likes our magazine very much. He says he's crazy about Tracy Richardson and the yarns Tracy spins. Well, you see, we really have something in this magazine if you dig into the stuff and take a little time out to read the articles as well as just look at the pictures. We really get sore at guys who never get beyond the "It-looked-interesting-but-I-didn't-have-time-to-read-it" stage.

Another new Engine Mechanic on our list is Charles Esler of Marion, Ind., who came through with a very swell paper for his test. David Katsanis of Upper Darby, Pa., scores well for his Observer's ticket with a long and detailed report on the flight training system employed in the United States. Dave really did a swell job on this and went to a lot of trouble in getting good, sound advice from the right people.

Air Adventurer James R. Mayes of Yorkville, Ill., writes: "I have been interested in airplane engines for a long time and I have been experimenting with model airplane engines for my model planes. I have a large collection of airplane-engine pictures and diagrams which I study regularly because I want to do this sort of work when I get out of school. I have also been trying to experiment with Diesel engine installation in small pursuit planes."

Well, there's the kind of news we like to get from our members. It help give us an idea what our Air Advenurers are interested in and aids in our selecting material for the magazine. Let's have more of this sort of thing.

Another nice letter from Erlon Johnson of 38 Junior Avenue, Buffalo, N. Y., who says: "I work in a jobbing *(Turn to page 63)*

On the Oregon Contest Trail, where the trees grow tall and gas buggies fly high, the members of the Salem club stage a Blitzkrieg at the Portland contest. The boys seem to do very nice work.

Model success story. Meet Mel Anderson, the designer of the Super Cyclone engines.

Model matters

Gordon Light's Dope Can. Moon's On The Field.

THE DOPE CAN. (By Gordon Light.) The San Diego Skyriders (California) have a well-rounded membership that includes such extremely useful professions as linemen, carpenters, policemen, firemen, and sailors. Club members can handle capably such aspects of flying as retrieving models off wires, extinguishing crack-up fires, fishing models out of the lake adjoining the flying field, or shooting down models that get too high. Primarily, the S. D. S. outfit was rubber-powered until Carl Goldberg visited them last February. Now it's practically a Zipper club. West coasters seem to like Carl just about as much as we do in the East—which is plenty. At least that's one aspect of the model hobby that most persons seem to agree on.

Mrs. Leta MacAllister, secretary of the Skyriders, has a secret ambition to be the first woman to get a first in a California gas-model contest. She has this distinction in rubber competition—after a year's work she took two firsts with 13:39 and 15:00. If it takes a year to win a gas-model contest, Mrs. MacAllister is afraid she won't have any fingers left. Her competitors will be limited to men fliers, since she is the only woman active in this area.

Model building was prescribed for Jerry Money of New York City to help him recover his health. It did the trick and he recommends it for any adult with a bad case of the "jitters." This brings to mind the old story about the father who thought his son wasn't getting enough exercise and was spending too much time over the workbench cementing sticks together. So Junior took the old man along the next time he went out flying. He suggested that papa chase a few flights so he could learn at first hand how much exercise was involved. After a few long flights, papa had lost his breath and gained a healthy respect for the physical prowess of a model builder. Of course, Junior didn't tell that as a rule he never retrieved his own models—the interested kids who hung around the field could always be counted on to do that.

Owners of small motors will probably find help in Fred Palmer's suggestion that Kleenex or similar tissue be used for filtering the gas-oil mixture. Keeping the mixture free from dirt and grit was a big headache until he hit on this idea. He also had trouble keeping track of the fine wire used to ream dirt out of the needle valve until he soldered it to a strip of brass about two inches long.

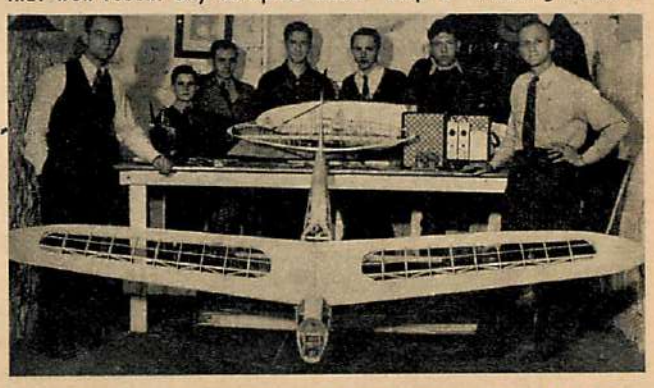
Lightest wing loading we've heard about in a long time is that of living organisms such as forms of bacteria which are so light that in still air they settle only a fraction of an inch per hour. Sounds like a good idea for an indoor glider—provided you equip contest officials with a microscope powerful enough to keep it in sight.

Donald Mosher is a fifteen-year-old model shop *(Turn to page 62)*

Canadian production increase. Ken Gibbs, Brandon, Manitoba, and gas model constructed by himself and Chester Wilkinson.

Ernest Shott, Lebanon, Pennsylvania, and his Brown-powered Scientific Commodore. "Bungo-Bungo" Light hails from there, too.

Frank Mesa, Manhattan Airscrews, with Brown-powered C job that won recent Sky Scrapers meet. Ship is "Floating Power."

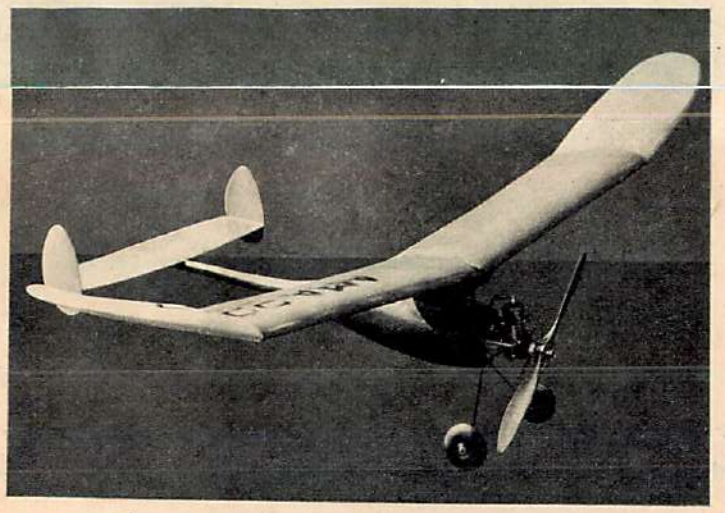


And these faces belong to members of Marion Gas Model Airplane Club. They meet Mondays in Elk Temple, Marion, Ohio.

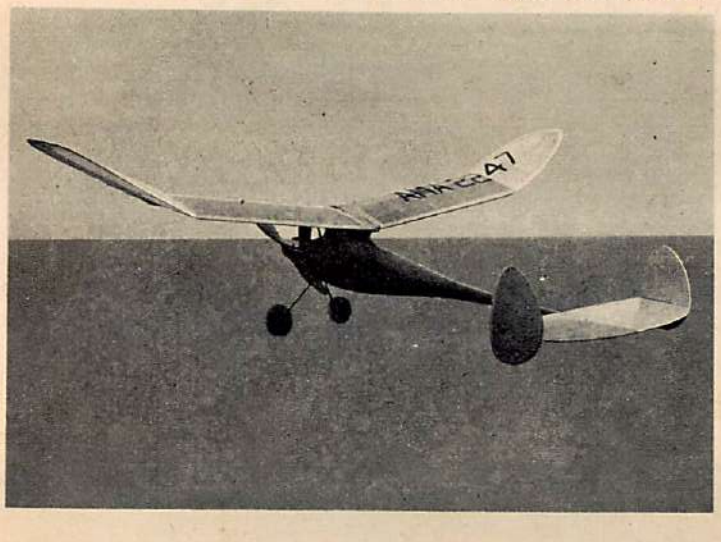
THE HERALD

BY R. GENE GHAILLE

This B job climbs like a homesick angel. And even a feather has a higher sinking speed. That's the impression we got.



The planked fuselage has circular cross section fading to a boom at tail. Metal tube inside boom stiffens structure. Engine is Ohlsson 23.



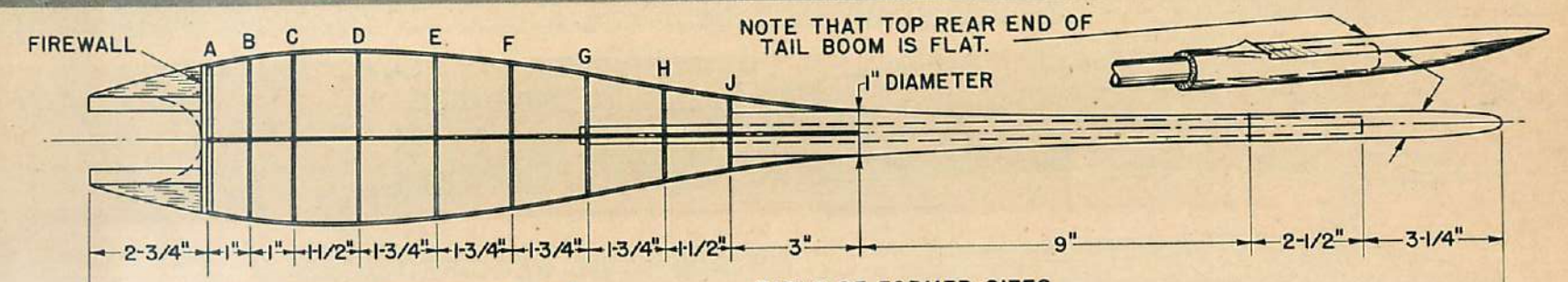
Stabilizer is sheet balsa, cambered, paper covered. Sheet rudders attached at stab tips hold camber. Fuselage is red; wings, yellow.

THE HERALD is the second model of this design that the author has built. The first was built just before the 1940 rules went into effect. It had 288 square inches of wing area and weighed sixteen ounces. The power used was an Ohlsson "23," which took the little ship up in a hurry. It glided in tight flat left-hand circles and was very sensitive to the slightest updraft. Several of the first few test flights were over five minutes. The first official flight in a contest ended with a four-minute, thirty-second, out-of-sight flight.

The new Herald meets the 1940 rules and still retains the features of the older ship. The new ship, having to weigh more, has been planked. The wing area has been increased to 342 square inches and the wing mount raised slightly. This change has not hurt the performance any, for the climb is about the same and the glide has been improved. The model has not been flown in many contests yet, but it has placed well so far. The Herald took first place in the State model meet held at Lakeland, Florida, on last August 11th. About seventy contestants participated. Class A, B, and C ships competed against each other for the same prizes, so the Herald proved itself a winner by not only winning Class B, but also hanging up better times than the A or C jobs. During the week preceding this contest, it took a third place in a local contest on only an eight-second motor run.

CONSTRUCTION

The fuselage was designed to give a high degree of efficiency and also to be strong and not too difficult to build. It is not necessary to draw up full-size fuselage plans. Two keels are first cut from 1/8" sheet, according to the full-sized outline on the plans. Also mark the former spacing on them with ink. The formers are easily made by simply using a compass and drawing the correct-size circle directly on the balsa sheet. A table of former sizes is given on the plans. The firewall and Former A are both 1/8" plywood, and the rest of the formers are 1/16" sheet balsa. Be sure to cut the formers to the exact diameter given in order to assure a smooth planking job. Now a 1/8 x 1/4" notch it cut into the top and bottom of each former for the keels. Fit the keels into the notches and cement. Be sure to keep the formers at right angles to the keels. The boom is made from two pieces of 1/2 x 1 x 18" medium-hard balsa. Cut a groove down the center of each so when placed together a piece of 3/8" aluminum tubing will fit between them. The hollowing out of the groove can be simplified by using a template in the form of a semicircle of 3/8" diameter. Notice that the groove is only 14 1/2" long, which leaves 3 1/2" of *(Turn to page 53)*

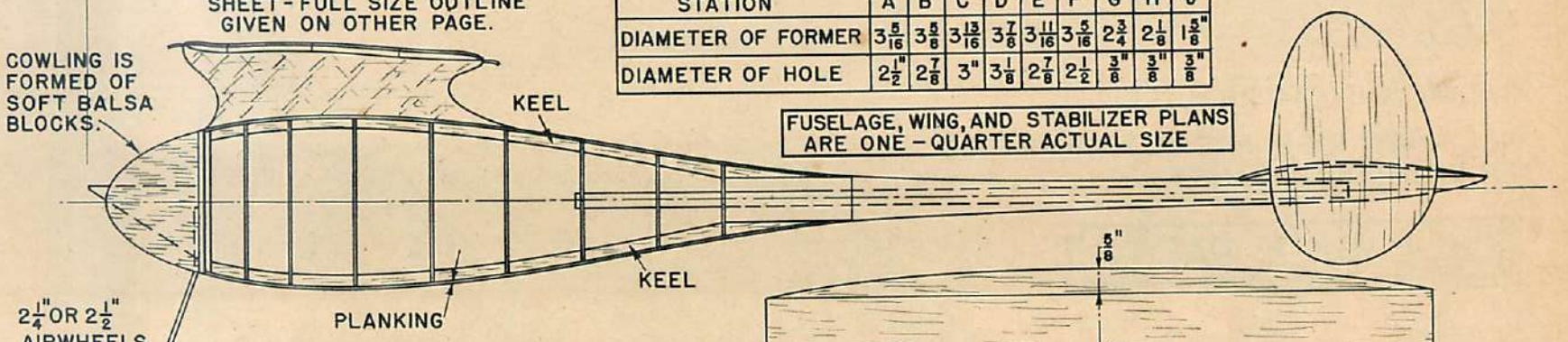


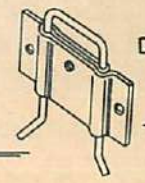
WING MOUNT IS THREE-PLY 1/16" SHEET - FULL SIZE OUTLINE GIVEN ON OTHER PAGE.

TABLE OF FORMER SIZES

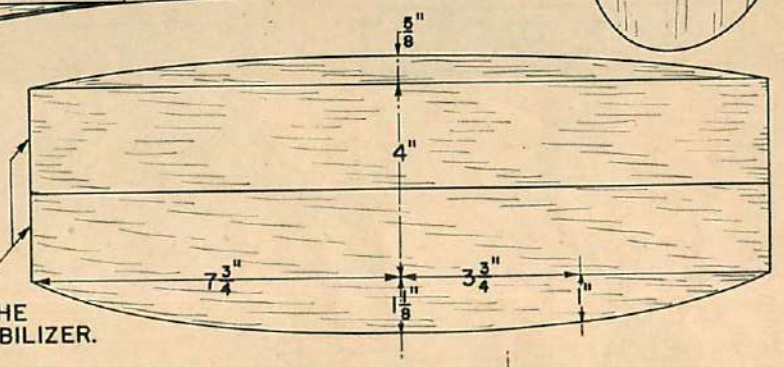
STATION	A	B	C	D	E	F	G	H	J
DIAMETER OF FORMER	3 5/16	3 5/8	3 13/16	3 7/8	3 11/16	3 5/16	2 3/4	2 1/8	1 5/8"
DIAMETER OF HOLE	2 1/2"	2 7/8	3"	3 1/8	2 7/8	2 1/2	3/8"	3/8"	3/8"

FUSELAGE, WING, AND STABILIZER PLANS ARE ONE - QUARTER ACTUAL SIZE

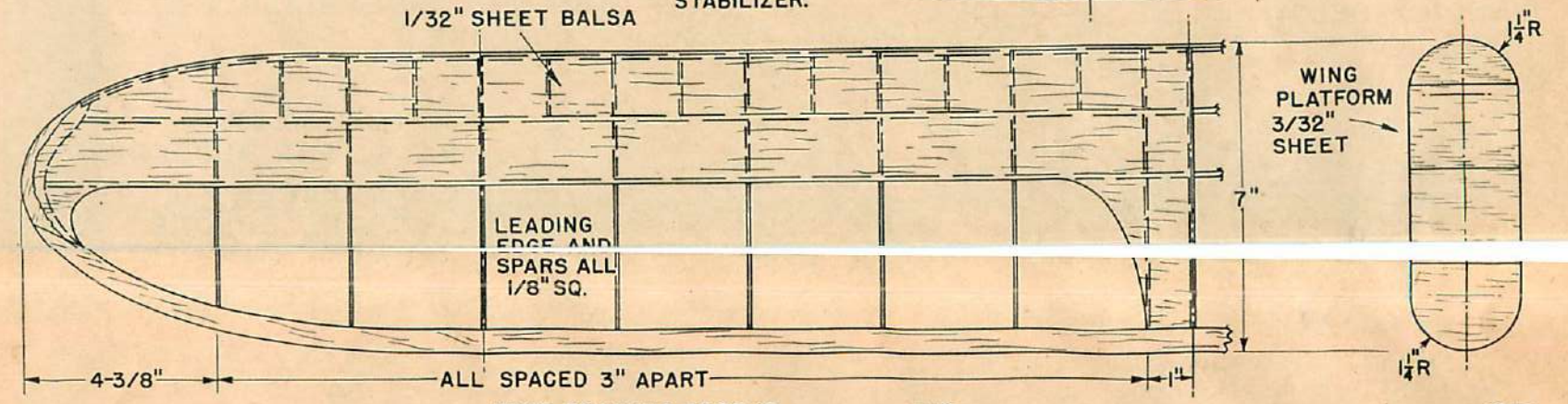




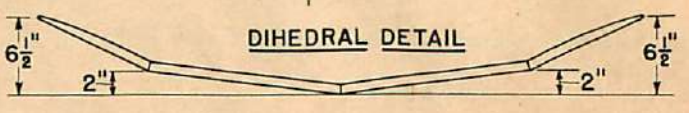
DETAIL OF LANDING GEAR MOUNTING CLAMP. USE DURAL OR ALUMINUM-ABOUT .040"



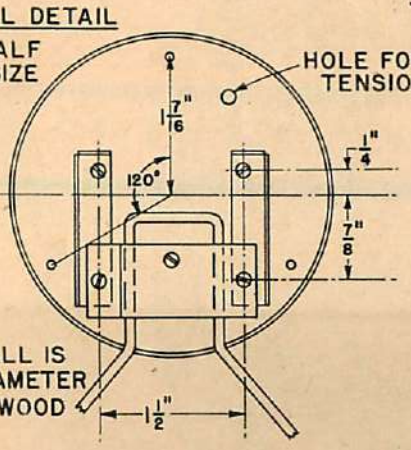
TWO SHEETS OF 1/8"X3" BUTT-CEMENTED TO FORM THE STABILIZER.



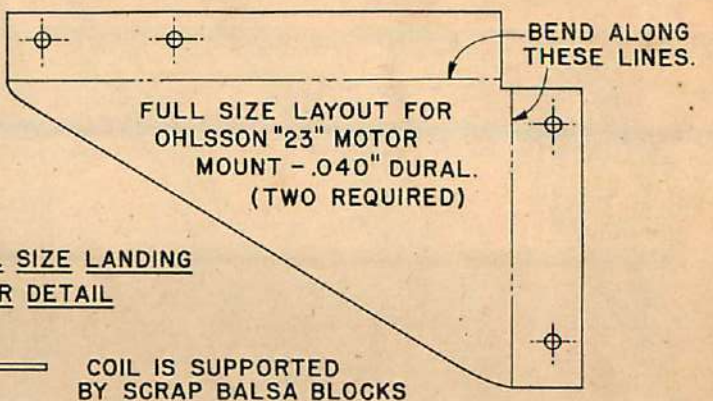
WING TRAILING EDGE IS 3/16" X 1/2" HARD BALSA

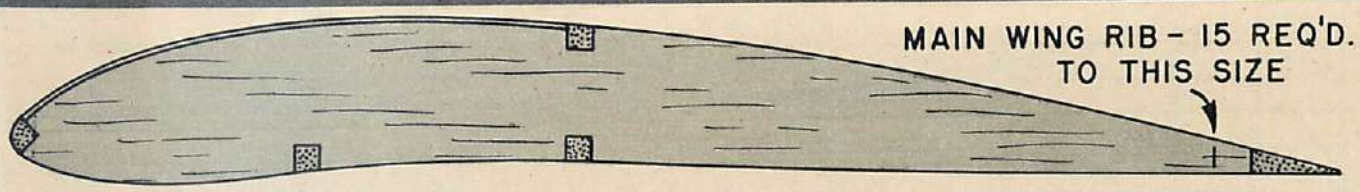


FIREWALL DETAIL
ONE - HALF ACTUAL SIZE

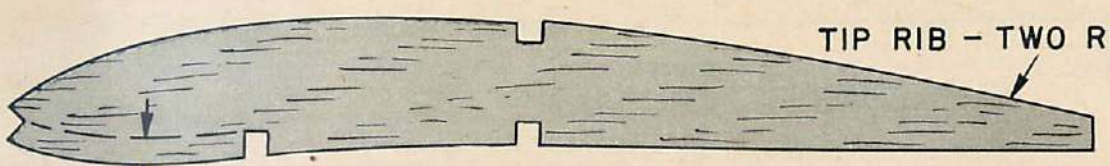


FIREWALL IS 3-3/8" DIAMETER 1/8" PLYWOOD





MAIN WING RIB – 15 REQ'D. TRIM TWO TO THIS SIZE



TIP RIB – TWO REQUIRED

FALSE RIB – 14 REQUIRED.

ALL WING RIBS ARE CUT FROM 1/16" THICK MEDIUM BALSA.

FULL SIZE PARTS

KEEL IS GIVEN FULL SIZE. CUT TWO FROM STRAIGHT-GRAINED 1/8" SHEET

TRACE FORMER SPACE MARKINGS ONTO KEELS BEFORE ASSEMBLING THE FUSELAGE.

WING MOUNT MADE UP OF 3 PLY 1/16" BALSA AS PER SKETCH DIRECTLY BELOW

USE 1/16" MEDIUM BALSA FOR RUDDERS SANDPAPER TO SHAPE BEFORE CEMENTING TO STABILIZER.

STABILIZER RIB- CUT ONE FROM 1/2" SHEET.

WING TIP IS CUT FROM MEDIUM 3/16" SHEET.

NATIONALS OR BUST!

It was a 2000-mile trek to Chicago, and adventure stalked them even at night. P. S. This year's Nationals due soon.

BY HENRY COLE, JR.

AT last we were all packed to go to the Nationals, but alas, there was no room for Stockwell's feet. Scrambling out of the car, five boys in Tacoma, Washington, Eugene Biddle, Hank Cole, Chuck Hollinger, Martin Stockwell and Ed Williams, began pulling stuff out of the trailer and repacking it. Planes, sleeping bags, suitcases and lunch boxes were scattered all over the yard. Again we packed everything into the trailer and the car, but still there was no room for Stockwell's feet. With a final good-by and a shower of last-minute advice from our parents, we started off on the two-thousand-mile trip to Chicago. After a week of packing, building a trailer and slapping planes together, our dreams had come true. We were going to the 1940 Nationals.

The first night we stopped at a trailer camp in Yakima, Washington. By the time we had finished carrying everything into the single cabin, it was a problem to get from one side of the room to the other. Late into the night, balsa shavings flew through the air, and the strong smell of dope gave a true model builder's atmosphere.

Early the following morning we were rolling along through eastern Washington when Biddle, who was reading the road map, suddenly shouted to stop. He then explained that we should have turned right instead of left at the last crossroad. After following Biddle's directions, we sped along on the new road. However, as the miles slipped under us, the road began to get narrower and bumpier. We all looked at Biddle, whose face was now a brilliant red. When we found that we had gone seventy-five miles out of our way, Biddle was relieved of road-map reading for the rest of the trip. From that time on we called him Wrong Way Biddle.

That evening we camped out on the desert in Idaho. The mosquitoes were so thick that we were forced *(Turn to page 57)*

Flying was swell on Great Salt Lake Desert, but it was 125 in shade.

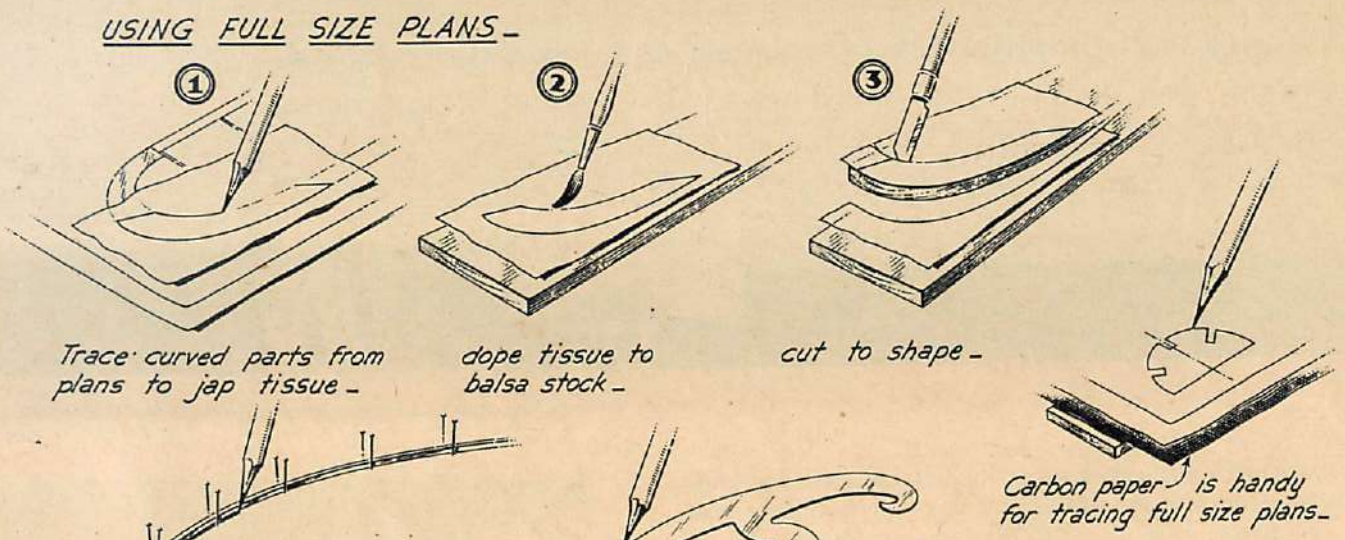
On desert we slept in open in sleeping bags like seals on an ice field.

The author winding for an out-of-sight flight—unofficial. The old story.

Fixing planes for Nationals at tourist camp on outskirts of Chicago.

HOW TO ENLARGE PLANS

It really isn't hard. It's just knowing how. With these tricks you'll know how.



MANY more models would be built from magazine plans if the readers could more easily convert the plans into full-scale working drawings. Many model builders do not exercise the ingenuity when preparing working drawings that is evidenced in the construction of their models. The other day a friend remarked that he thought he would scale down the record-holding Buzzard gas model to Class B size; an easy job for the fellow who knows the few tricks necessary to quickly change the scale of drawings. The accompanying sketches show a few time-saving methods used to convert printed plans, small scale or full scale, into working drawings.

When plans are to be enlarged an even multiple of their original size, any one of several simple methods may be used. Each dimension can be stepped off with a pair of dividers the number of times it is to be increased in size, or much the same system can be used by marking a dimension on a slip of paper and adding its length the proper number of times.

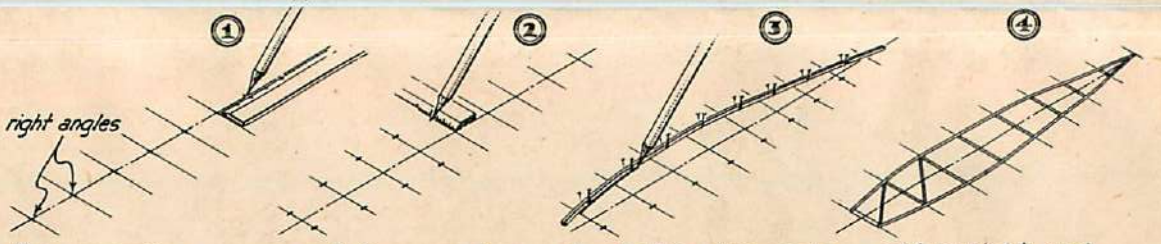
Drawings which are printed at "odd" scales present a greater problem unless they include a graphic scale. Otherwise it is best to establish a scale by taking a given dimension or some part of known size and converting it into inches.

Grid lines are frequently shown on plans to facilitate the enlargement of irregular parts. Draw the grid accurately to the indicated scale, mark the intersection points, sketch the lines through the points, compare the proportions of the large drawing with the original, make any necessary corrections, then finally draw in the lines more heavily.

There is no instrument quite as useful in enlarging or reducing drawings as a pair of proportional dividers. Some of these instruments are expensive, but there are others which are moderately priced. The modeler who can beg, borrow or steal a pair can handle almost any problem concerning plans with little or no trouble. By means of the graduated scale, or by trial, the proportional dividers may be quickly adjusted to the desired proportions. As one set of points are opened to a dimension on a small-scale plan, for example, opposite points open to proper size.

Preparing working drawings isn't so boring, after all. Learn how to do it without wasting a lot of time and see if you don't agree.

ENLARGING A FUSELAGE SIDE



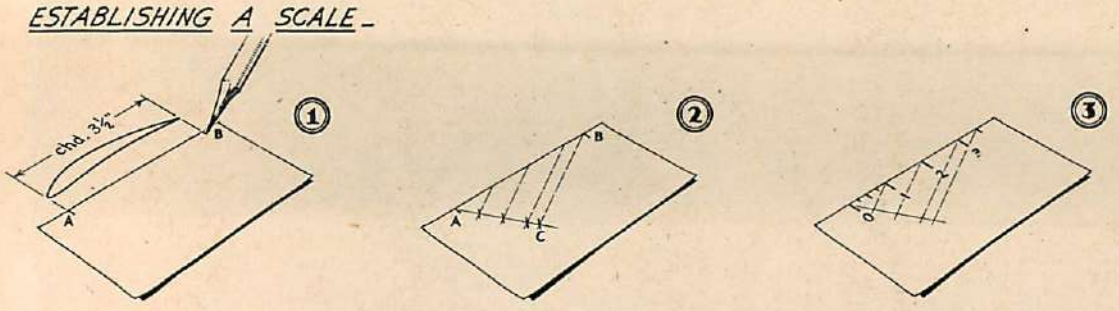
Draw centerline – mark spacing of vertical braces –

mark longerons from measurements on the printed plans –

bend strip along marks as guide for drawing curved longerons –

add upright and diagonal braces as shown on plans.

ESTABLISHING A SCALE –



Take a given dimension from the plans –

draw diagonal from one end (A), mark (in this case) three and one-half units along AC – connect C and B – draw lines through points parallel to BC –

scale of plan is established where parallel lines intersect edge of sheet – may be used to measure other parts of plan.

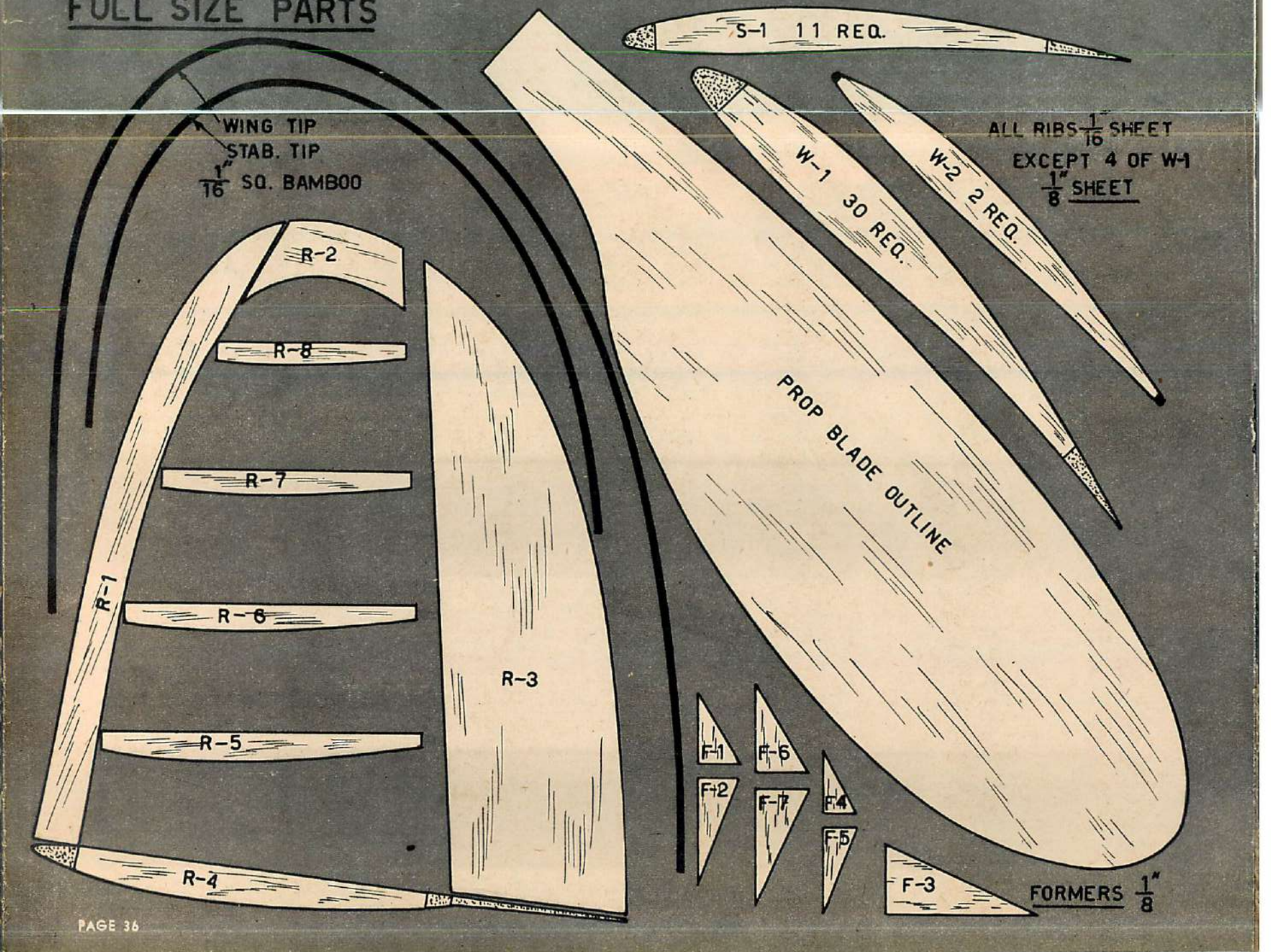
MEET THE YP-43

The 350 m. p. h. Republic YP-
pursuit-interceptor is powere

43 Lancer lowers its wheels to match slower speed of camera ship. This
ed with 1,200 h.p. Twin Wasp. Note cloth strips on wing for air flow study.

CAHILL'S

FULL SIZE PARTS



SUPER CLODHOPPER

BY JIM CAHILL

PLANS BY HENRY STRUCK

When we asked Wakefield Winner Cahill if the efficiency of his Clodhopper could be combined with simple construction, this design was his answer. It's worth a try.

THE efficient and stable design of the Clodhopper has been worked into this simple model. Light construction permits the use of a multistrand motor and plenty of slack without burdening the ship with excess weight.

The separate wing panels have a twofold value. First, should the model strike an obstruction they will jump free without damage, and second, the model may be more easily transported.

Although the ship has not yet been entered in any meets, test flights indicate it will give a good account of itself in competition.

CONSTRUCTION

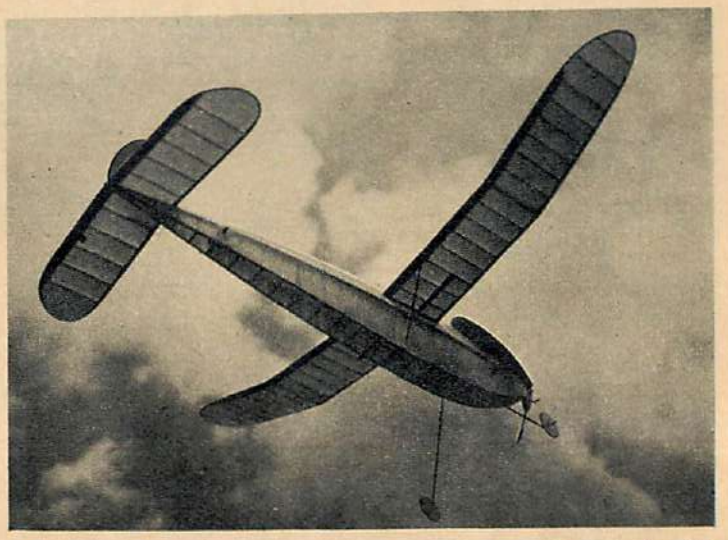
Enlarge the plans to full size. A convenient chart of fuselage dimensions is given for this purpose. The wing and tail can be easily laid out by using the full-size tip and rib shapes. Cut out the scales given and use them as convenient rulers to pick off dimensions of the view to which they apply.

The fuselage is of rectangular cross section and built up of 1/8" square hard balsa. Build both sides at the same time, one atop the other, to assure identical frames. Join the sides at the widest points, pull the ends together and insert the remaining crosspieces. Cut the side stringers from soft 1/8" sheet balsa, using the fuselage top outline to get the correct curve. Reinforce the front and rear of the body as well as the wing position with sheet balsa and formers as illustrated. Note that the tail plug is built up integral with the body and then cut off after assembly is complete.

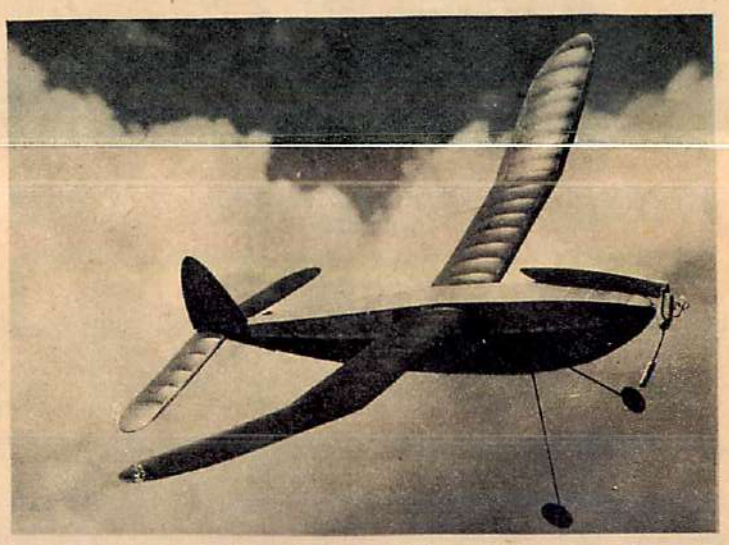
The landing gear is formed of 1/16" piano wire and sandwiched between two pieces of 1/8" sheet to hold it in the fuselage. Use several coats of cement for added strength. The wheels, either of balsa or plywood, are held in place with a couple of washers soldered on the axles.

Shape the nose plug with knife and sandpaper from a block of hard balsa and cement a sheet of 1/4" balsa to the rear of it, fitting it snugly in the nose. Carve the one-bladed prop from a block of medium balsa. Shape the blade to an airfoil section, undercambering the back about 1/8". Polish with fine sandpaper and apply several coats of dope. Attach small brass plates as bearings and the hinge shafts and counterweight arm of 1/16" piano wire with plenty of cement. To make the counterweight itself, drill a large hole in a hardwood block and set the wire arm in it. Melt down a quantity of lead or solder greater than required for perfect balance, and pour it carefully into the mold. When cool the weight can be smoothed and the prop perfectly balanced by filing. Cut the prop with a razor blade, rounding the rear corners so that the blade folds back freely. Cement brass-plate bearings to both sides of the nose plug and drive a small wood screw into the back as a stop for the rubber tensioner. Adjust the power of the spring (wound of .020 wire) at the front of the prop to pull the spur of the shaft forward against the screw before the rubber hangs slack.

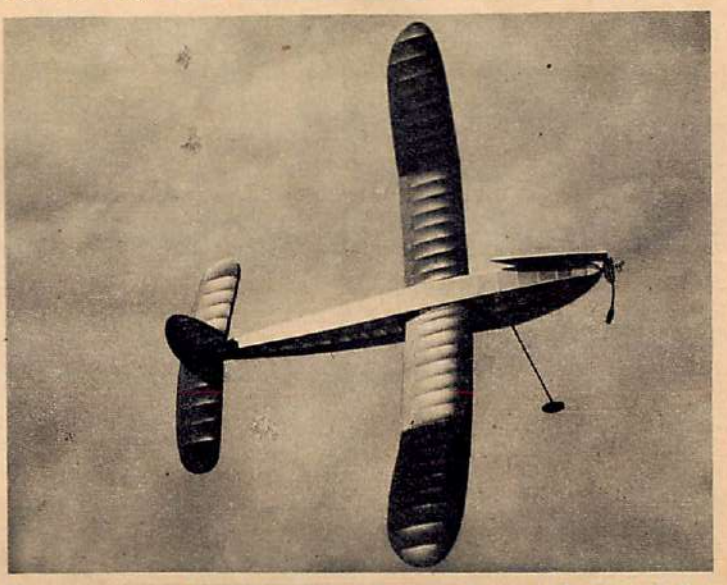
The wings and tail are of identical construction. Cut out the required number of ribs. The leading and trail- *(Turn to page 54)*



Fuselage is of a deep rectangular cross section with a single wide stringer along each side. Fuselage is covered with bamboo paper.

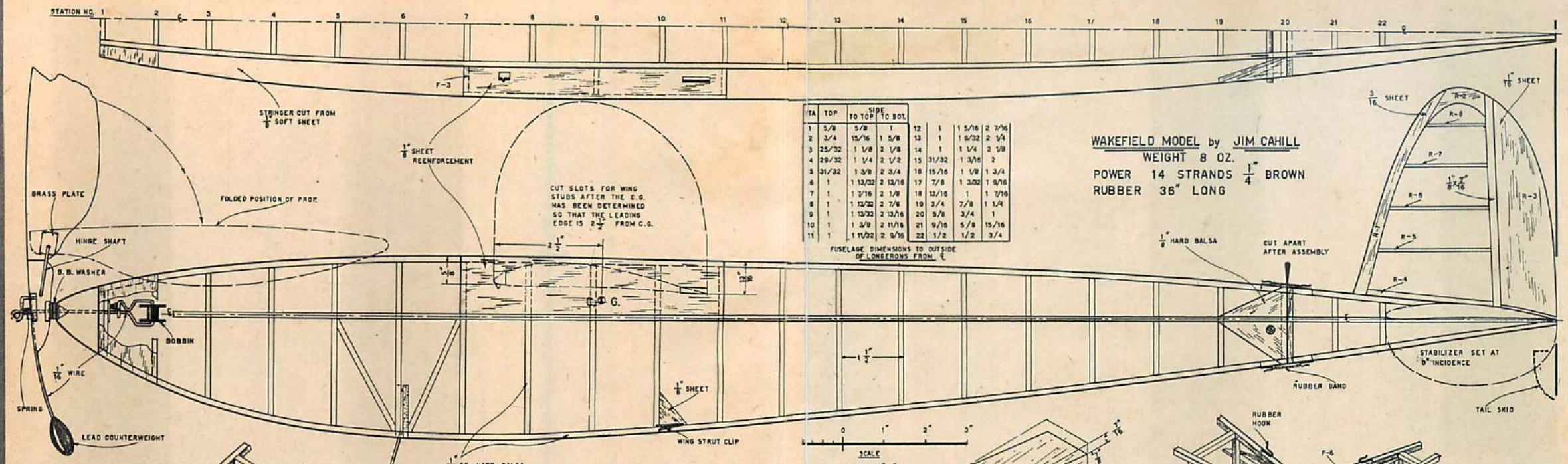


Cathedral, or inverted dihedral, is used in stabilizer. Stab skids are used for single-wheel-chassis installations for balance on take-off.



The wings are made in two detachable panels which fit against the fuselage sides. Rubber band in fuselage grips hooks on each panel.

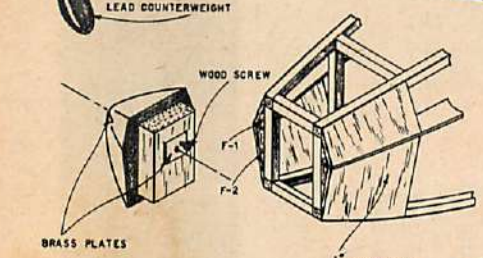
CAHILL'S SUPER CLODHOPPER



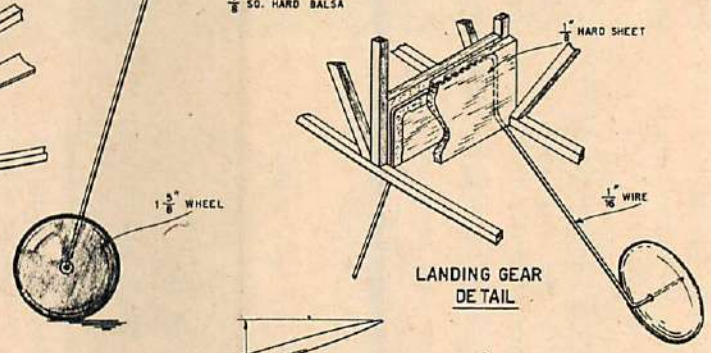
STA	TOP	SIDE TO TOP	SIDE TO BOT.
1	5/8	5/8	1
2	3/4	15/16	1 5/8
3	25/32	1 1/8	2 1/8
4	29/32	1 1/4	2 1/2
5	31/32	1 3/8	2 3/4
6	1	1 13/32	2 13/16
7	1	1 3/16	2 1/8
8	1	1 13/32	2 7/8
9	1	1 13/32	2 13/16
10	1	1 3/8	2 11/16
11	1	1 11/32	2 9/16
12	1	1 5/16	2 7/16
13	1	1 9/32	2 1/4
14	1	1 1/4	2 1/8
15	31/32	1 3/16	2
16	15/16	1 1/8	1 3/4
17	7/8	1 3/32	1 9/16
18	13/16	1	1 7/16
19	3/4	7/8	1 1/4
20	5/8	3/4	1
21	9/16	5/8	15/16
22	1/2	1/2	3/4

FUSELAGE DIMENSIONS TO OUTSIDE OF LONGERONS FROM ℄

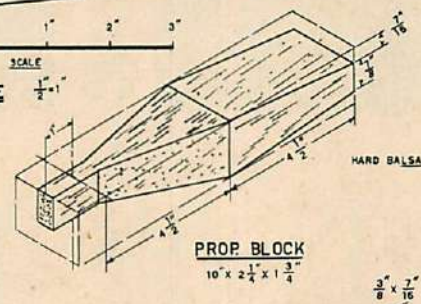
FUSELAGE 1/2"=1"



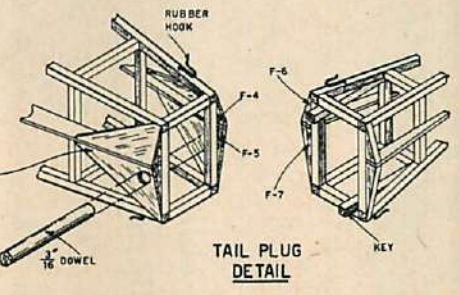
NOSE PLUG DETAIL



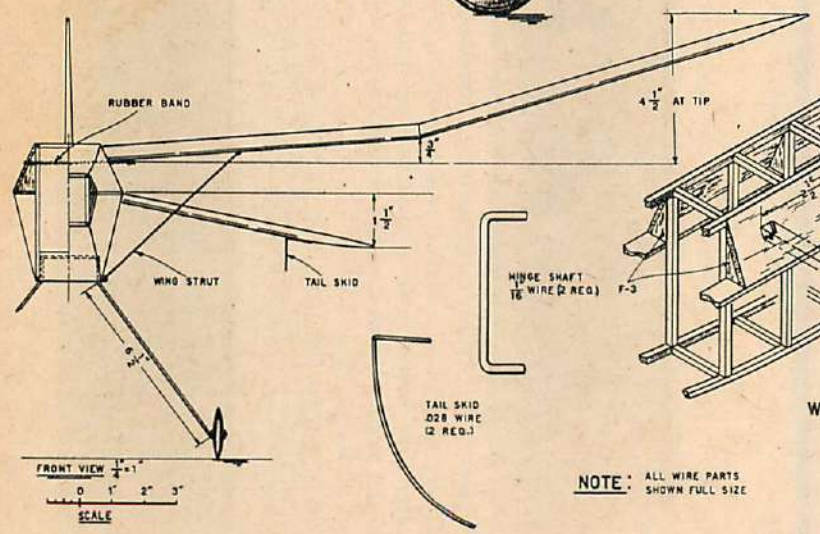
LANDING GEAR DETAIL



PROP. BLOCK
10" X 2 1/4" X 1 3/4"



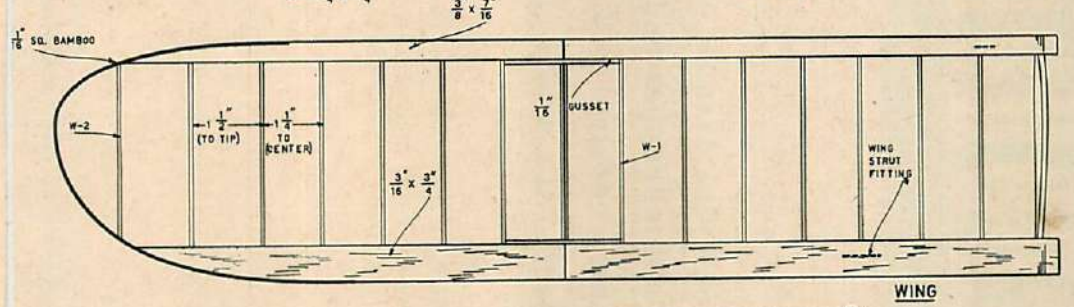
TAIL PLUG DETAIL



WING MOUNT DETAIL

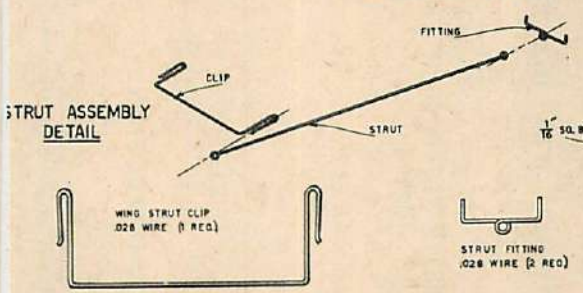
NOTE: ALL WIRE PARTS SHOWN FULL SIZE

RUBBER HOOK .028 WIRE (6 REQ.)



WING

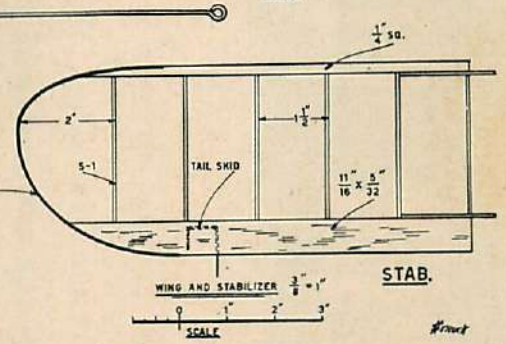
WING STRUT .028 WIRE (2 REQ.)



STRUT ASSEMBLY DETAIL

WING STRUT CLIP .028 WIRE (1 REQ.)

STRUT FITTING .028 WIRE (2 REQ.)



STAB.

WING AND STABILIZER 3/8"=1"
0 1" 2" 3"
SCALE

DOWN THE RUNWAY

Official aeromodeling news compiled by the Academy of Model Aeronautics, governing body of model aviation in America.

CONDUCTED BY AL LEWIS, • EXECUTIVE DIRECTOR

DURING the period of April through December, 1940, the A. M. A. demonstrated that it was "big business" by taking in $10,393.16 and spending $11,710.50. This financial statement is taken from figures compiled by James A. Councillor & Co., of Washington, D. C., certified public accountants. Most amazing feature is not the amount of money handled by the Academy, but rather that it has reached so quickly the state where it has "books" to be audited. In early 1939 the A. M. A. had seventy-two dollars in the bank and boasted a membership of seventy-two die-hards who had been hanging on as members during the darker ages of American model aëronautics (1934-1939). Came 1939 and a revitalized A. M. A., then 1940 and a rejuvenated N. A. A.—result was Academy taking over work of old N. A. A. model division and building up 500 sanctioned meets in 1940 with 2,500,000 official flights made by 10,000 licensed aëromodelers. Incidental figures showed that during the same period 250,000 modelers were members of A. M. A. chapters or affiliated clubs.

The financial statement of the Academy shows an expense of $1,317.34 in excess of income for 1940. Leader members of the organization are not downhearted, however, for at the time the report was issued, A. M. A. headquarters had on hand $1,626.95 in official materials and office supplies, in addition to considerable equipment purchased and/or collected during the year. Colonel G. deFreest Larner, general manager of N. A. A., approves A. M. A. progress. Model activity now set up under A. M. A. direction can pay its own way, a possibility previously challenged by some who contended that the model aëronauts of America could not support a governing body. This exceptional record is a tribute to the loyalty, foresightedness and convictions of those individuals who have maintained interest and membership in the Academy during the past seven years.

★ ★ ★

Official model aircraft competition regulations were once like a football—everybody kicked 'em around. Now *(Turn to page 56)*

★ ★

HOW HIGH IS IT?

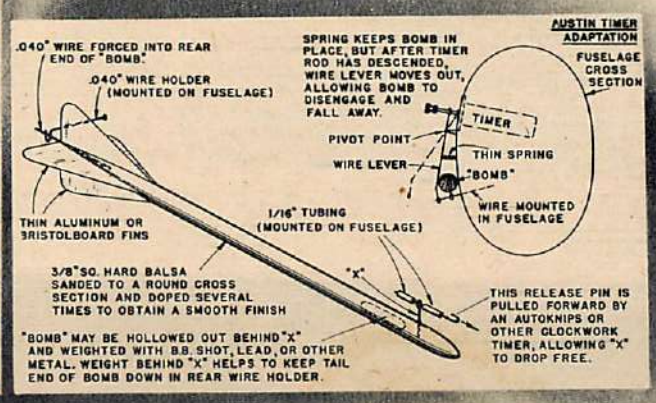
BY GIL SHURMAN

With this gadget and a stop watch you'll know the rate of climb.

TIME IN SECONDS	HEIGHT IN FEET
3.0	144
3.1	153
3.2	162
3.3	174
3.4	185
3.5	195
3.6	206
3.7	218
3.8	230
3.9	241
4.0	256
4.1	268
4.2	282
4.3	295
4.4	310
4.5	324
4.6	340
4.7	354
4.8	368
4.9	384
5.0	400
5.1	416
5.2	431
5.3	450
5.4	467
5.5	485
5.6	502
5.7	520
5.8	537
5.9	556
6.0	575
6.1	595
6.2	615
6.3	634
6.4	655
6.5	674
6.6	695
6.7	720
6.8	740
6.9	762
7.0	784

BY employing a simple formula of physics, the gas-model builder can determine quite accurately the altitude of his gas job. This is important in computing the rate of climb which gas jobbers like to talk so much about. The trouble is, nearly every model builder overestimates the altitude of his model when he judges it by eye, as his imagination is given free reign.

The formula is the one used to find the distance a body drops when the time interval is known. It is $S=\frac{1}{2}GT^2$. S stands for the distance, or height, G is the acceleration of gravity, which is 32 feet per second, and T represents the time interval.



The way to use this formula to get the altitude of a gas job is merely to let something fall from the model and accurately time its descent. The ideal "bomb" in this case would be an arrow. It can be made long enough to be easily seen, yet it would fall with so little air resistance that this factor could be ignored.

The method and time the arrow is to be released deserve careful consideration. If the rate of climb is to be determined, the arrow should be dropped immediately after the engine stops. This is a convenience, for the engine flight timer can also release the arrow when it cuts the engine. The accompanying sketch suggests a practical device for holding the arrow—or "bomb"—and releasing it; however, the modeler may have some ideas of his own about this.

The arrow should be at least 1 foot long and ⅜ inch or ½ inch in diameter. It should be sanded very smooth and doped well so as to offer as little air resistance as possible. The front part of the arrow should be rounded, and the rear end tapered to a point. Three or four fins are mounted at the rear end; they should be thin, lined up well, and free of war *(Turn to page 61)*

THE CHALLENGER

BY MARY LOUISE THOMAS

Out in Little Rock the fair sex is mopping up contests. Here's the ship that is doing it.

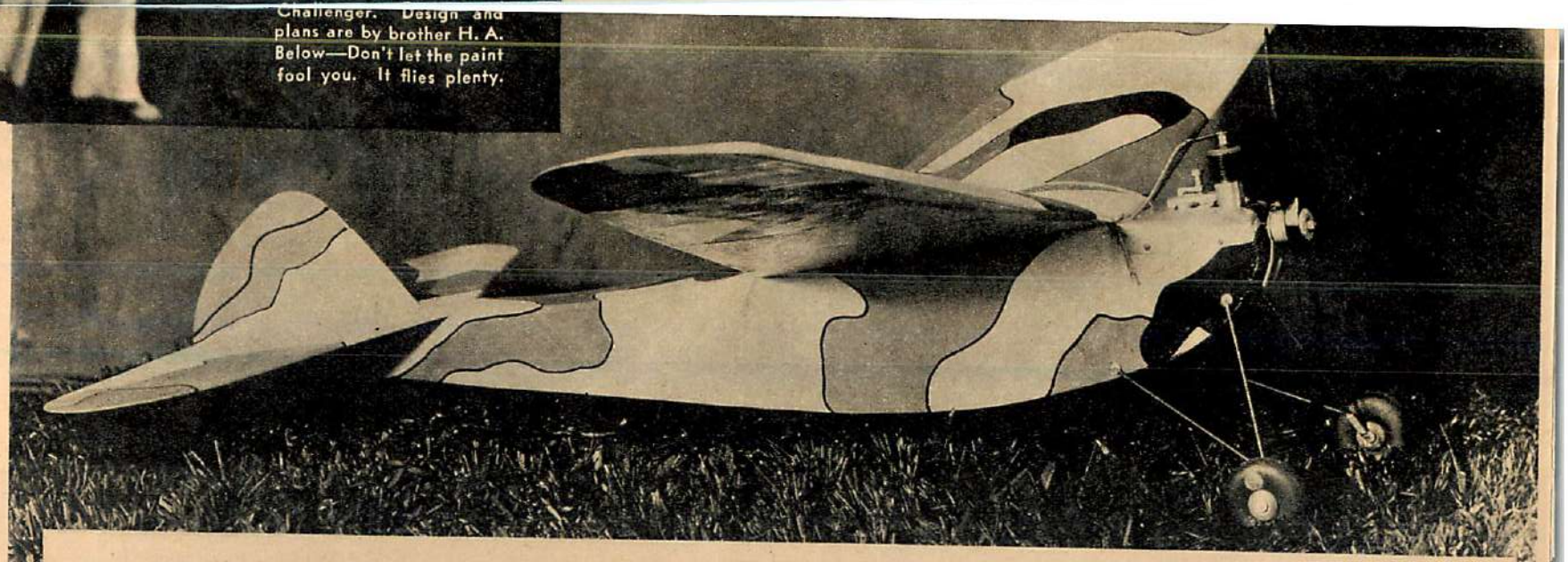
Myrt Thomas launches the Challenger. Design and plans are by brother H. A. Below—Don't let the paint fool you. It flies plenty.

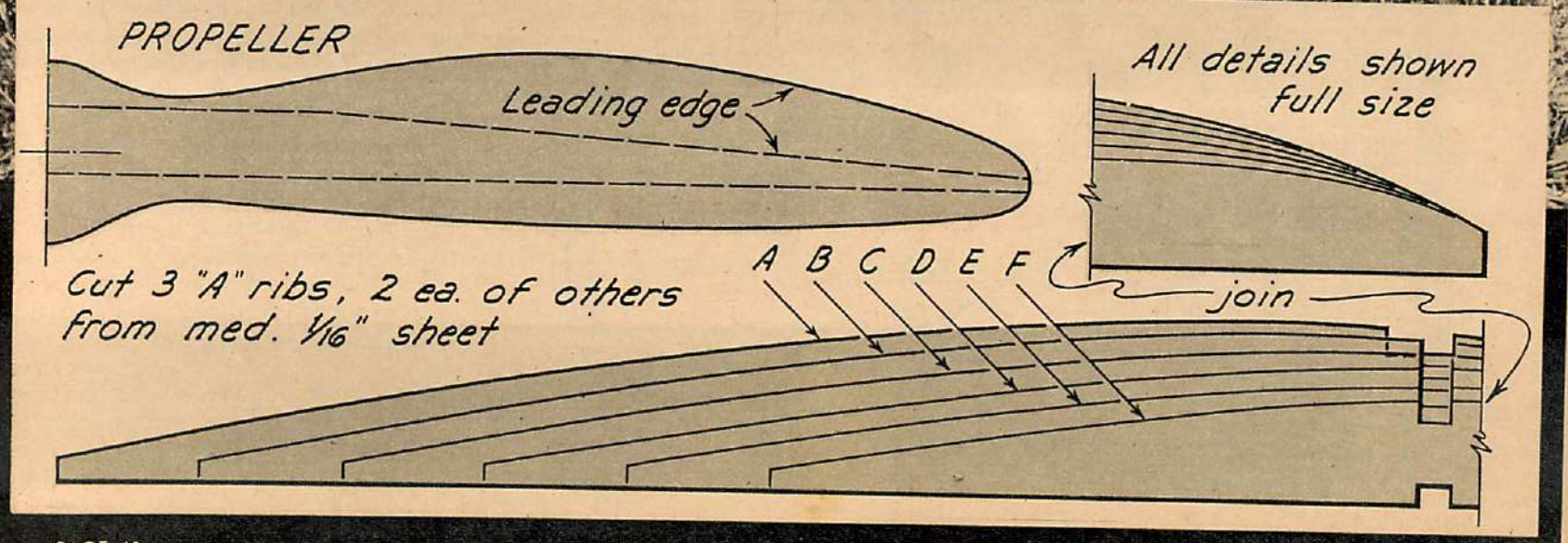
HAVING won a Class B motor, I was in the market for a plane to fit it. So I had friend brother, H. A. Thomas, design me a simple, sturdy model, and I built it. Entering it in a contest, I was fortunate enough to win first place in the B Class—winning another motor. The ship also took a first in B in our annual Exchange Club meet here in Little Rock, Arkansas.

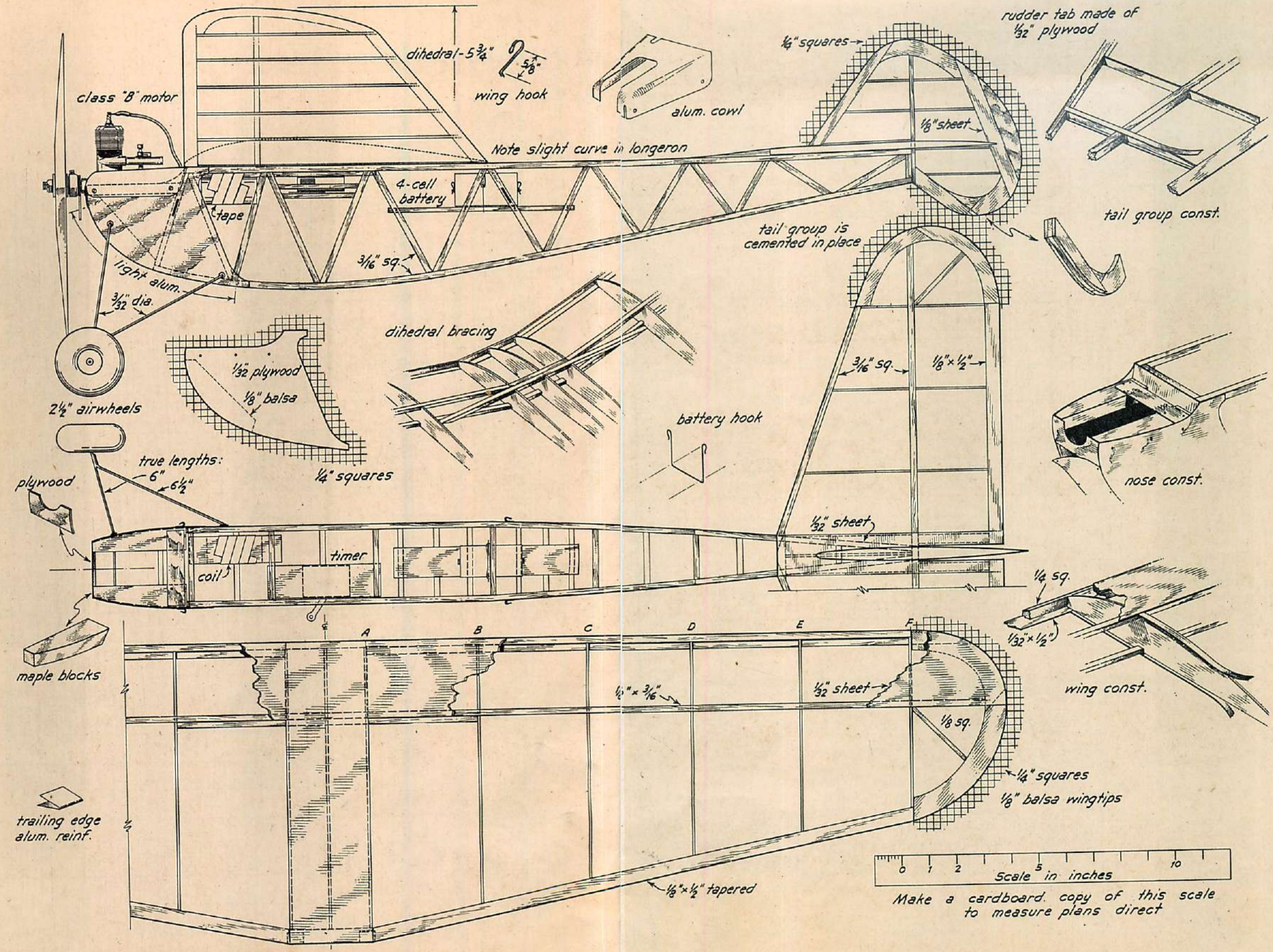
With its sharply tapered wing, large stabilizer and camouflage paint job, this model has a radical appearance, but has proved to be a dependable flier. It has a simplified airfoil which produces good results. The landing gear and motor mount are built to stand up under everyday flying—two things that frequently give trouble in small gas models.

There is no need in going into a detailed explanation of construction. The model is quite conventional in this respect and the builder should experience no difficulty with it. Make a cardboard duplicate of the scale to facilitate enlarging the plans. The grid shown on the tail and wing tip will make them easy to enlarge. Hard balsa should be used for all longerons, spars, leading and trailing edges, and softer balsa can be used for ribs, cross members, et cetera. Notice that the plywood pieces in the nose are reinforced below with pieces of 1/8" sheet balsa on the inner sides. Where the landing gear passes through the plywood, small plywood pieces should also be cemented on the inside as reinforcement. All ribs are cap-stripped above and below with 1/32 x 1/8" strips. The wing center section is completely covered with 1/32" sheet balsa.

(Turn to page 54)






dihedral - 5¾"
5/8"
wing hook
alum. cowl
rudder tab made of 1/32" plywood
¼" squares
1/8" sheet
class "B" motor
Note slight curve in longeron
4-cell battery
tape
3/16" sq.
light alum.
3/32" dia.
2½" airwheels
tail group is cemented in place
tail group const.
dihedral bracing
1/32" plywood
1/8" balsa
¼" squares
battery hook
3/16" sq.
1/8" × ½"
nose const.
true lengths:
6"
6½"
plywood
timer
coil
1/32" sheet
¼ sq.
1/32" × ½"
wing const.
maple blocks
A
B
C
D
E
F
1/8" × 3/16"
1/32" sheet
1/8 sq.
¼" squares
1/8" balsa wingtips
trailing edge alum. reinf.
1/8" × ½" tapered
0 1 2 5 10
Scale in inches
Make a cardboard copy of this scale to measure plans direct

DATE	LOCATION	NAME OF MEET	EVENTS	PRIZES	SPONSOR	SECRETARY
April 19	Boston, Mass.	Jordan-Traveler Indoor Meet (A)	Gliders, scale and semiscale	Point system		Gunnar Munnick, 101 Alstead St., Quincy, Mass.
April 19	Chicago, Ill.	Riser-Riders Indoor Record Trials	All indoor classes			Steven Obodzinski, 821 S. Hermitage Ave., Chicago, Ill.
April 20	Pine Valley (Berlin), N. J.	Spring Gas Meet (AAA)	All classes gas, beauty, stunt	Over $400 in prizes	South Jersey Gas Model Assn.	E. N. Angus, 24 Ormond St., Oaklyn, N. J.
April 20	Livermore, Calif.	Spring Gas Championships (AAA)	All classes gas	Motors and merchandise	Oakland Kiwanis & Cloud Dusters Clubs	Guy E. Dake, 1420 46th Ave., Oakland, Calif.
April 26	Philadelphia, Pa.	P. M. A. A. Sixth Indoor Flying Scale Model Meet				Victor R. Fritz, 1427 Spruce St., Philadelphia, Pa.
April 26	New York City	A. M. A. Record Trials at Creedmore, L. I.	All classes rubber and gliders			Frank Zaic, 100 E. 10th St., New York, N. Y.
April 26	Boston, Mass.	Jordan-Traveler Outdoor Meet (A)	All classes rubber and gliders	Point system		Gunnar Munnick, 101 Alstead St., Quincy, Mass.
April 27	Sacramento, Cal.	Second Annual A. M. A. Gas Model Contest (AA)	Gas, all classes	1st—$50 and perpetual trophy, 2nd-10th, gas motor kits and supplies		Theo. L. Ravallette, 3124 Fourth St., Sacramento, Cal.
April 27	Schenectady, N. Y.	Aeroneers Club Contest (A)	All outdoor classes			J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.
April 27	Silver Spring, Md.	Meet at White Oaks Field (AA)	Gas, beauty, rubber, and glider models	$100 in prizes		Louis B. Hess, 836 Sligo Ave., Silver Spring, Md.
May 2, 3, 4	San Francisco, Cal.	State-wide Gas and Rubber Meet (AAA)			"Vultures," A. M. A. chapter & Exchange Club	Dr. Irving Dundas, 291 Geary St., San Francisco, Cal.
May 3	Philadelphia, Pa.	P. M. A. A. Third Outdoor Endurance Meet (A)				Victor R. Fritz, 1427 Spruce St., Philadelphia, Pa.
May 3	Boston, Mass.	Jordan-Traveler Indoor Meet (A)	Stick H. L. and R. O. G. models	Point system		Gunnar Munnick, 101 Alstead St., Quincy, Mass.
May 4	St. Petersburg, Fla.	Record Trials for St. Petersburg Model Club	Gas, all classes			D. R. Persons, Box 1313A, St. Petersburg, Fla.
May 4	Atlanta, Ga.	Aero Engineers Club Contest (A)	Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
May 11	Denver, Col.	Record Trials for Exchange Gas Model Club of Denver	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
May 11	Pitman, N. J.	Spring Gas Meet (AA)	Gas, all classes, beauty and stunt	Merchandise in excess of $50	Pitman Kiwanis Club	E. N. Angus, 24 Ormond Ave., Oaklyn, N. J.
May 17	Philadelphia, Pa.	P. M. A. A. Fourth Outdoor Endurance Meet (A)				Victor R. Fritz, 1427 Spruce St., Philadelphia, Pa.
May 17	Boston, Mass.	Jordan-Traveler Indoor Meet (A)	Gliders, scale & semi-scale models	Point system		Gunnar Munnick, 101 Alstead St., Quincy, Mass.
May 17	Atlanta, Ga.	Aero Engineers Night Flying Contest (AA)	Steak fry after contest Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
May 18	Albany, N. Y.	Schenectady Aeroneers Meet (AA)	Combined gas event, tow-line gliders, rubber, stick & fuselage models	Merchandise & trophies		J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.
May 18	Pittsburgh, Pa.	Third Allegheny Mountain Area Model Meet (AA)	Gas, rubber, cabin & stick and glider models	Merchandise	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
May 31	New York City	A. M. A. Record Trials at Creedmore, L. I.	All classes rubber and gliders			Frank Zaic, 100 E. 10th St., New York, N. Y.
May 31	Philadelphia, Pa.	P. M. A. A. Indoor Championships (A)				Victor R. Fritz, 1427 Spruce St., Philadelphia, Pa.
May 31	Boston, Mass.	Jordan-Traveler Beginners' Competition (A)				Gunnar Munnick, 101 Alstead St., Quincy, Mass.
June 1	Baltimore, Md.	Aero-Craftsmen Meet (AAA)	Gas and rubber events	$200 in motors & merchandise. Spectator award		R. W. Stevens, 1833 Bolton St., Baltimore, Md.
June 1	St. Petersburg, Fla.	Record Trials	All classes gas			D. R. Persons, Box 1313A, St. Petersburg, Fla.
June 1	Steubenville, Ohio.	Sky Hawks' First Annual Invitation Meet (AA)	All classes gas, rubber and glider craft	7 gas motors, 9 gas model kits ($100 in merchandise prizes)	American Legion Argonne Post No. 33	Horace M. Southall, 544 Lawson Ave., Steubenville, O.
June 1	Geneva, N. Y.	R. O. W. Record Trials	All classes gas			Harold DeBolt, 1050 Elmwood Ave., Buffalo, N. Y.
June 7	Philadelphia, Pa.	P. M. A. A. Outdoor Championships (A)				Victor R. Fritz, 1427 Spruce St., Philadelphia, Pa.
June 7, 8	Boston, Mass.	New England Championship Meet (AAA)	Indoor & outdoor events	Trophies, cups, medals, merchandise	Jordan-Marsh Co.	Gunnar Munnick, 101 Alstead St., Quincy, Mass.
June 8	Washington, D. C.	Capitol Model Aeroneers' First Annual Invitation Meet (AA)	All classes gas	Motors and merchandise		Charles Weiss, 508 B. St., N. E. Washington, D. C

CONTEST CALENDAR

OFFICIAL ACADEMY OF MODEL AERONAUTICS SANCTIONED MODEL AIRCRAFT MEETS ★ ★ ★

THE following is a listing of model aviation contests which had been sanctioned by the contest board of the Academy at the time this issue went to press. As meets are approved they will be added to this listing each month.

Under the new regulations A. M. A. classifies contests and record trials as follows: Class A—Closed Competition, a contest open only to members of a single model airplane club, or affiliated model airplane organizations; Class AA—Invitation Contest, open to licensed model fliers with awards available to all who enter; Class AAA, State or Regional Championship Contest, which is large in size, draws 100 or more contestants, and offers important awards; Class AAAA, National and International Championship Contest, which offers traditional trophies of the Academy of Model Aeronautics; and Record Trials, a contest conducted for the sole purpose of providing an opportunity and facilities for attempts to establish or surpass official model-aircraft duration records, with no special awards offered to the winners.

DATE	LOCATION	NAME OF MEET	EVENTS	PRIZES	SPONSOR	SECRETARY
June 8	Denver, Col.	Exchange Gas Model Club's Record Trials	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
June 8	Butte, Mont.	Montana State Model Aviation Contest (AAA)	All classes gas & rubber	Grand prize trophy & trip to Nationals or Regional Meet, others	Montana Exchange Club	Dr. W. E. Selner, 425 Central Ave., Great Falls, Mont.
June 8	Woodruff, N. J.	Aeronauts Invitation Meet (AA)	All types gas models, beauty & stunt events	$100 in prizes	Vineland Aeronauts	Andrew Cannio, 116 Quince St., Vineland, N. J.
June 8	Albany, N. Y.	State Exchange Club Meet (AAA)	Gas & rubber	Trophies, medals, merchandise	N. Y. State Exchange Clubs	Harry Copeland, 712 Loew Bldg., Syracuse, N. Y.
June 14, 15	Atlanta, Ga.	Southeastern Meet (AAA)	Gas & rubber	Several hundred dollars in prize awards		W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
June 15	Marshalltown, Iowa	Tallcorn State Meet (AAA)	Gas and rubber	$200 in prizes		Wallace R. Blake, 321 N. 3rd St., Marshalltown, Ia.
June 15	Silver Spring, Md.	Meet at White Oaks Field (AA).	Gas, beauty, rubber & glider	$100 in prizes	Silver Spring Aeronauts	Louis B. Hess, 836 Sligo Ave., Silver Spring, Md.
June 15	Pittsburgh, Pa.	Fourth A. M. A. Meet (AA)	Gas, rubber & gliders	Merchandise awards	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
June 21	Atlanta, Ga.	Aero Engineers Night Flying Contest (AA)	Steak fry after contest Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
June 22	Springfield, Del. Co., Pa.	Second Annual Gas Meet (AA)	All classes, stunt & beauty event	Merchandise awards & team trophy	Springfield Gas Model Club	Louis B. Rose, 259 Powell Rd., Springfield, Del. Co., Pa.
June 22	Amsterdam, N. Y.	Capitol District Aeronautical Association Record Trials	All classes outdoor models			J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.
June 22	Wilmington, N. C.	State Rubber & Gas Championships (AAA)			Exchange Clubs	Loyd Hathaway, City Recreation Dept., Winston-Salem, N. C.
June 22	Beloit, Wis.	8th Annual Southern Wis. & Northern Ill. Meet (AA)	Gas & rubber	Trophies, motors, kits & cash	A. P. Warner Chapter N. A. A.	George Niebauer, 1860 Park Ave., Beloit, Wis.
June 22	Pittsburgh, Pa.	Allegheny Mountain Area Seaplane Meet (AA)	Gas & rubber cabin R. O. W.	Merchandise awards	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
June 28	New York City	A. M. A. Record Trials at Creedmore, L. I.	All classes rubber and gliders			Frank Zaic, 100 E. 10th St., New York, N. Y.
July 2, 3, 4, 5	Chicago, Ill.	14th Annual National Championship Meet (AAAA)	All traditional events	Yes	Chicago Times & Chicago Park District	Complete details given in April Air Trails
July 6	Denver, Col.	Record Trials for Exchange Gas Model Club	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
July 6	Atlanta, Ga.	Aero Engineers Club Contest (A)	Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
July 12	Baltimore, Md.	Aero-Craftsmen First Beachcombers' Meet (AA)	R. O. W. gas all classes	$50 in prizes		R. W. Stevens, 1833 Bolton St., Baltimore, Md.
July 19	Atlanta, Ga.	Aero Engineers Night Flying Contest (AA)	Steak fry after contest Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
July 20	Pittsburgh, Pa.	Fourth Allegheny Mountain Area Model Meet (AA)	Gas, rubber, cabin & stick & glider models	Merchandise prizes	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
July 20	Albany, N. Y.	Capitol District Aeronautical Association Meet (AA)	All classes gas & rubber	Merchandise & trophies		J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.

(Turn to page 64)

"DON'T QUOTE ME!"

Talk of the trade as overheard in factory, field, store.

R. A. Jumonville, right; W. Norman.

SUCCESS STORY

Like many model concerns, the Mod-Kraff Co., of New Orleans, La., was established in a shack. Back in 1928, Mr. Jumonville had no idea of the scope his business might enjoy, and with his brother he founded the present enterprise in a small building with twenty-eight feet of floor space and an original investment of five dollars. The concern immediately began designing, manufacturing and packaging kits (for which they still get calls) and first offered them as premiums to local business enterprises. Business was good almost from the start, and soon the small firm started a wholesale business with department stores and neighborhood model shops throughout the town. In this way a real business was built up and a steady demand was established.

A few years later the firm sold the idea to the *(Turn to page 66)*

Mod-Kraff, New Orleans, started on $5.

JUNIOR MOTORS CORP., of Philadelphia has taken on some government work during lulls in engine production in order to be able to keep and pay skilled help until such time as they can be switched over to model-engine production. Miniature Motors, manufacturers of the Bantam, also are engaged on government contracts.

As a follow-up to the tremendously popular gas-engine survey, this publication will publish in the forthcoming issue a gas-model-kit survey which will include three-view drawings, photos, and specifications.

Cliff Rogers, president of Model Industry Association and Syncro Devices, has severed his relations with the Detroit firm, though retaining his financial interests. Operating now out of Philadelphia, Rogers has introduced the Rogers K. D. "29" gas-engine kit for $4.95 and will shortly have a "29" ready to run for $7.95. A "62" will be on the market in the near future.

Frank Zaic's Model Aircraft Yearbook, nearly two years late this time, is being rushed to completion for release before the Nationals. Editorial copy is said to be at the compositors' already.

Joe Ott, the nation's outstanding mass production model-airplane-kit designer, is putting on a new line of models which will be sold by the Sadler Sales Inc., of Chicago. One of the numbers in the new line will be a streamlined Class B gas model in which the motor is located at the center of gravity and the propeller is driven by an extended shaft.

Which New York model shop has seventy-one (count 'em) built-up airplane models hanging on display?

The following new numbers have been announced by the Comet Model Airplane & Supply Company: 25-cent flying Heinkel fighter and Blackburn Skua, a 10-cent flying Arado, an 18-inch detailed 50-cent Westland Lysander, and a $1 35-inch Blackburn Shark.

Herkimer Tool & Model Works are not overlooking "Spindizzies," and have added the Tornado race-car engine to their O. K. line. The new engine has a double-bearing crankshaft, rotary valve with downdraft carburetor. The timer is in the back of the crankcase. Price, $24.50.

William Brown's (formerly with Junior Motors Corp.) gas engine is called the Pioneer Brown Kit PB-292-K, priced at $4.95.

Berkeley Models, Inc., are introducing a new line of 25-cent flying models. Actually they are models of models: Buccaneer, Flying Cloud, Muskateer and an unnamed low-wing job. $^3/_{32}$"-square construction will be used throughout.

Champion Products Co. has, as of March 31st, discontinued marketing their Atwood Engine through dealers. A new low list price will be in effect.

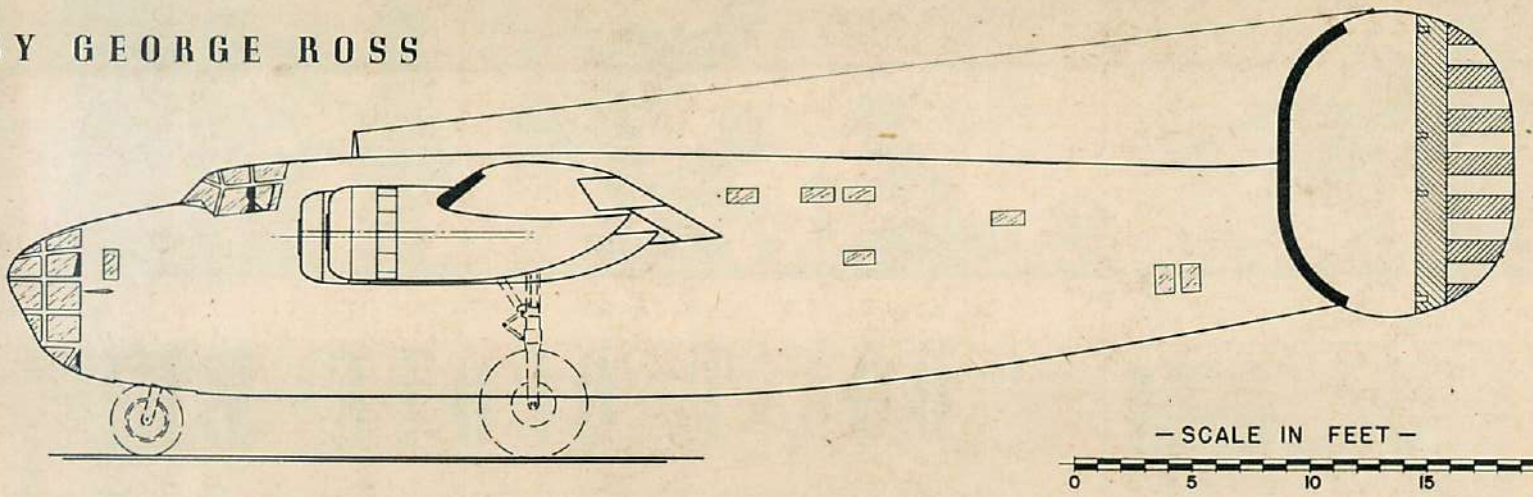
Dealers, attention! If you want to know what the other fellow is doing, or if you'd like him to know what you've been doing—tips for boosting sales, ideas, gossip—use "Don't Quote Me!" to swap information, tall stories and what-have-you.

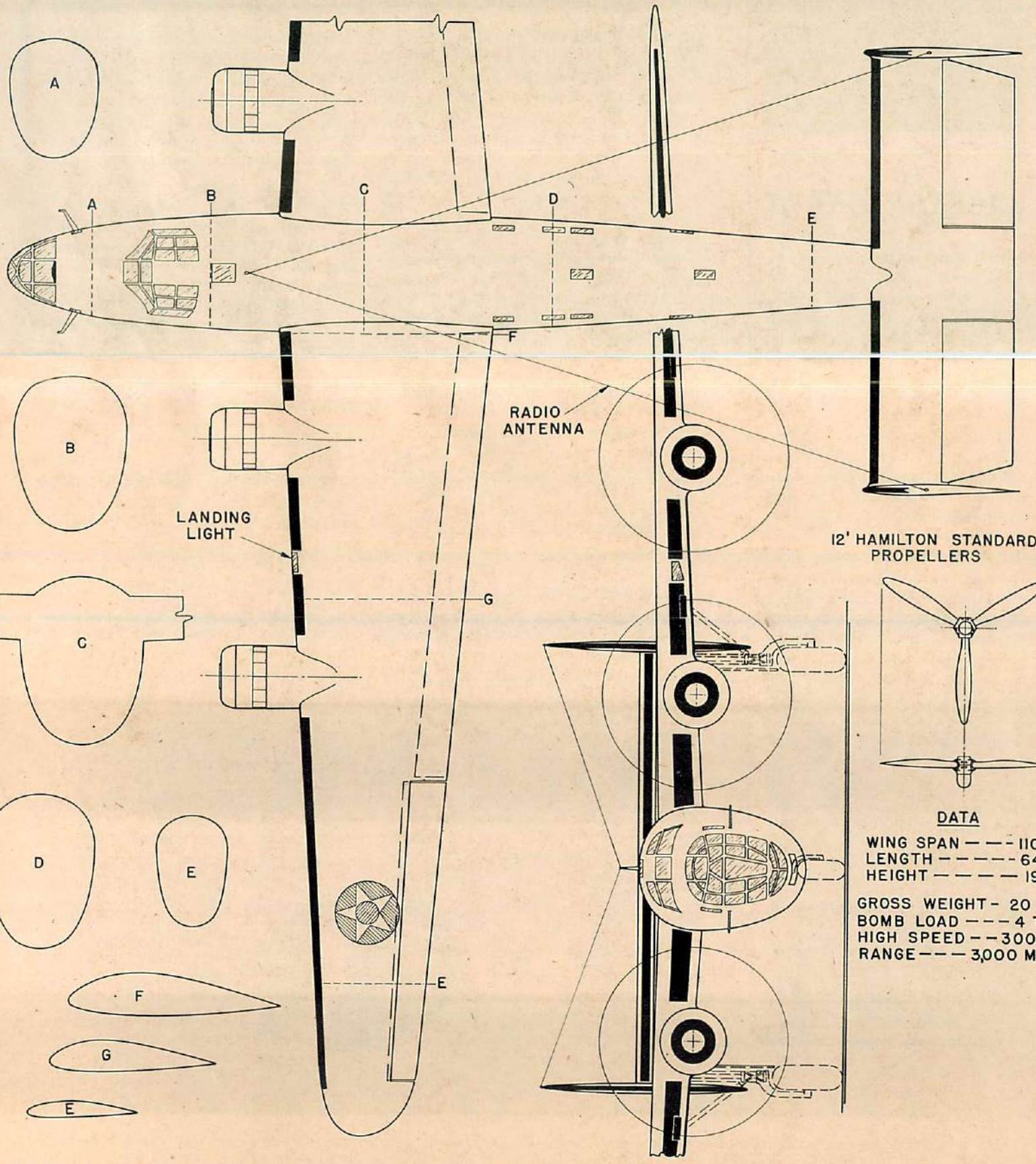
Get to know the other guy. This month we report how friend R. A. Jumonville did a Horatio Alger in New Orleans. Bet you can't beat it! Pat Sweeney, Chicago, thinks he can. He'll tell you all about his nifty shop and nice business next month.

BY THE TRAVELING SALESMAN

CONSOLIDATED B24 ARMY BOMBER

BY GEORGE ROSS





12' HAMILTON STANDARD PROPELLERS

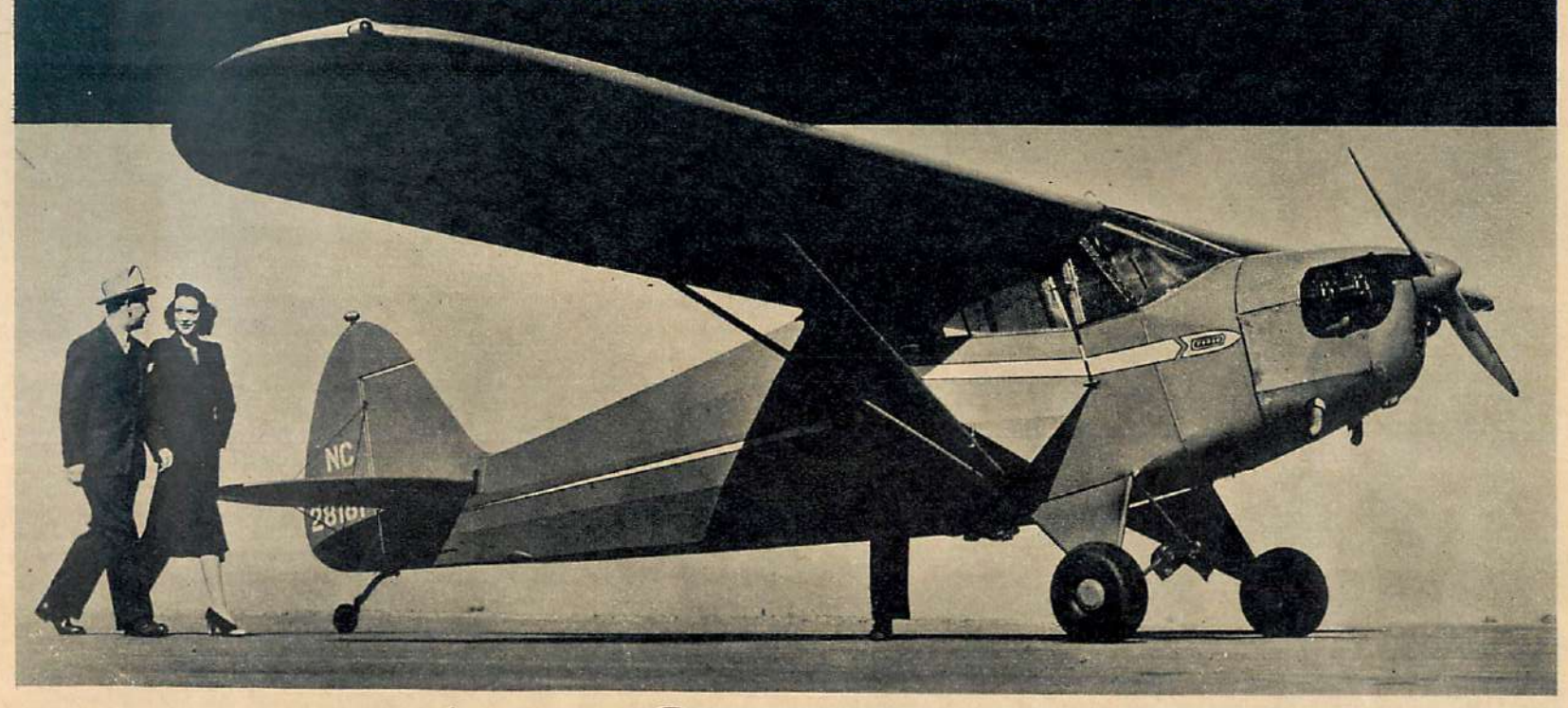
DATA

WING SPAN — — — 110'
LENGTH — — — — — 64'
HEIGHT — — — — 19'

GROSS WEIGHT - 20 TONS
BOMB LOAD — — — 4 TONS
HIGH SPEED — — 300 M.P.H.
RANGE — — — 3,000 MILES

PIPER POINTS THE WAY TO

. . . A MONEY-MAKING PLANE FOR OPERATORS
. . . A BIGGER PLANE FOR PRIVATE OWNERS
. . . AN ALL-PURPOSE PLANE FOR FLYING CLUBS



THE *Three-Place* PIPER CRUISER

with Mechanical Engine Starter

Introduced only last year, the three-place Piper Cruiser has speedily become the favorite of fliers desiring low first cost, economical operation and greater load capacity. It fulfills your every flight requirement. With dual controls in place the Cruiser is an ideal 2-S trainer. An engine starter, 450-mile cruising range, compensated compass and dual hydraulic brakes provide a safe, easy-to-fly cross-country airplane. Navigation lights and battery permit night flying. A stainless-steel exhaust muffler, side-by-side seating accommodations for two passengers and the economy of a dual-ignition 75-horsepower engine make it a real money-maker for pay-hopping. See your Piper Dealer for free flight demonstration. Priced at only $1995, F.A.F. Lock Haven, Pa.

FREE FLYING COURSE in his own plane is offered the purchaser of a new Piper. It consists of eight hours of dual flight instruction . . . take-offs, landings, taxiing and fundamental air maneuvers. At the completion of this free course the average person is ready to solo.

FREE FOLDER showing all the new Piper planes and details of the free flying course will be sent you on request or may be obtained from your Piper Dealer. If you wish a copy of the new Piper deluxe, full-color 16-page catalog it will be gladly mailed you providing you enclose 10c in stamps or coin to cover postage-handling. Piper Aircraft Corp., Dept. T51, Lock Haven, Penna.

No Extra Cost for these Extra Features!

- ★ ENGINE STARTER *Standard Equipment*
- ★ TAIL WHEEL *Standard Equipment*
- ★ NAVIGATION LIGHTS *Standard Equipment*
- ★ CHOICE OF LYCOMING GEARED 75 OR CONTINENTAL 75-HORSEPOWER ENGINE
- ★ BATTERY & COMPASS *Standard Equipment*

Tune in "Wings of Destiny" NBC Every Friday 10 P.M. (E. S. T.)
Continental "65" Piper Cub Given Away Each Week

PIPER OUTSELLS ALL OTHER LIGHT PLANES COMBINED

They Learned From The Birds

(Continued from page 25)

ideas and opportunities for progress in aëronautical design and construction. Hawley Bowlus, the well-known designer of high-performance sailplanes and secondary gliders, and the man who taught Colonel Lindbergh the art of gliding, used to glide stuffed gulls in his effort to learn more about the secrets of natural flight. This also used to be a favorite stunt of the Wright Brothers during the years they spent in their study of mechanical flight.

In attempting to draw a line of comparison between the flight of a bird and the flight of an airplane, it is interesting to note the evolution of the airfoil section of an airplane wing from that of the wing of a bird. This is outlined in the contours shown in Figure 1. Early experimenters with flight so closely patterned their wings after those of a bird that many were seen with contours similar to the average bird-wing contour. Note how smooth and streamlined is the contour of an albatross' wing. It is undoubtedly here that most of the albatross' ability to soar is derived. The contour might even be comparable to some airplanes which are built today. Finally, a typical airfoil section is shown for the purpose of comparison. Of course, it is much deeper than a bird wing to allow for additional lift, and also to accommodate the structure which is required.

Early airplanes also incorporated another feature in their birdlike wings which is never seen today. Lateral control—or wing-tip control—was achieved on most gliders and planes by warping the tips of the wings out of alignment. This was a stunt copied directly from the birds, since all birds will bank and turn, and maintain control in a side gust, by elevating or depressing the feathers along the trailing edge of the wing tips. This warping of the wings in early airplane designs led directly to the adoption of the aileron as we know it today. The aileron is nothing but a refined method of warping the trailing edge of a wing.

Man's nearest approach in airplane design to the design of any type of bird is the gull-wing type of glider which is quite popular today. This is the designer's attempt to "undersling" the body of the glider in a manner similar to that of a bird's, and thus gain additional stability and soaring ability. A few years ago the Bonney Gull glider was probably the best example of this type of gull-wing design that we shall ever see. The wing had a very decided gull effect at the root, and even the tip planform was patterned after the sharp tip of a bird's wing.

It is a little-known fact that many of these high-performance types of gliders have a lower wing loading than that of the average-type sea gull, and yet no one will argue the fact that they are not able to soar as efficiently as a gull. The reason? Man's inability to this date to be able to imitate the flight of birds one hundred percent.

Aspect ratio—the ratio between the span and the chord of any wing—has a direct effect on the soaring ability of any body, and as the aspect ratio is increased the efficiency of the wing is increased. Many birds, such as the albatross, may have an aspect ratio as high as twenty or twenty-five to one, and yet we cannot build a wing which will even begin to approach these figures. Our knowledge of materials is such that we are not able to design a wing which will withstand the stresses with an aspect ratio much over eighteen to one, and these are figures which represent the best we have been able to produce in sailplane design to date.

To summarize the aspect-ratio problem: Sailplanes which must have very high performance are designed like a gull or an albatross. Pursuit planes, however, which must have very high speed and good maneuverability, are designed like a hawk or a sparrow. A comparison between the flight of an albatross and a hawk will give a graphic illustration of the basic differences between the flight of a sailplane or large commercial airliner, and the flight of a pursuit ship. The one has good soaring ability and long-range flight characteristics; the other is speedy, highly maneuverable and easily handled.

The best soarer among all the birds is the albatross, with sea gulls running a fair second. Their soaring ability is attained through the well-streamlined design of their bodies, and the planform and aërodynamic design of their wings. The body of the wandering albatross is not very large, being about as big as that of a goose or turkey, but the wings may measure from ten to fourteen feet from tip to tip. They are very long and narrow wings, and hence their aërodynamic efficiency is very high. The design of a good many high-performance soaring gliders is patterned after just such birds as the albatross. The wing on the German Darmstadt II was one of the first to closely approach the design of the albatross wing. A glider has even been built and named Albatross because its general outline features follow so closely those of the bird. The soaring plane Wien and the Bowlus sailplane are other good examples of this type of construction.

Sea gulls are also excellent soarers, and being found on practically all our coasts and large inland waters, are easily available for study. A sea gull soars with his head kept well pointed forward to reduce the air resistance, and also keeps his feet well tucked up against the lower surface of his body and tail. It was by the careful observation of this leg-folding habit of soaring birds that aëronautical engineers first conceived the idea of retractable landing gears for airplanes.

But the study of bird flight is by no means complete. Although the science of ornithology is centuries old, there is still much that we do not know or do not understand. The study of birds is absorbingly interesting from any point of view, either flying or design, and much can still be learned. The practical experimenters of today will eventually give us more of the information we so urgently desire: from that day on, the science of aëronautics will profit immeasurably.

Glider Troopships

(Continued from page 23)

ship to the tow plane. Behind the pilots the eight soldiers of each glider are trying to relax in their cramped quarters. They are seated in pairs, side by side, in four compartments. Special clamp racks hold their guns and ammunition. The hand grenades are in a bag slung over their shoulders. These are of a special type and will not blow up on contact in case of a crash landing. In addition, dynamite is carried on this particular mission, the objective being to destroy the enemy's lines of communication.

The bombers used for towing these gliders are by now obsolete, too slow and poorly armed to hold their own with the fast enemy pursuits. As tow planes, however, they are ideal; having a cruising speed of 150 miles per hour; towing three gliders they are slowed up to only 130 miles per hour. They do not carry any bombs on board, and the crew consists of pilot, communication officer and two gunners. Their objective being two hundred miles requires a four-hour gas supply, while originally they had a six-hour cruising range with a full load of bombs. The pilots have flown the route on a number of night bombing expeditions; and tonight they do not have to penetrate deep into the enemy territory. Shortly after they cross its front lines the gliders will release and sail silently to their destination point and the work of the tow pilot will be over. By now they have reached their maximum altitude of 13,500 feet, and in an hour's time have crossed the enemy lines. As they fly above the overcast, searchlights cannot locate them, and the antiaircraft fire does them no damage. Another ten minutes and a crisp command from the tow-plane pilots through the intercommunicating phones informs the glider pilots that they have reached the parting of the ways. A quick pull on the release mechanism accompanied by a sharp click and the gliders are free from the towing cables.

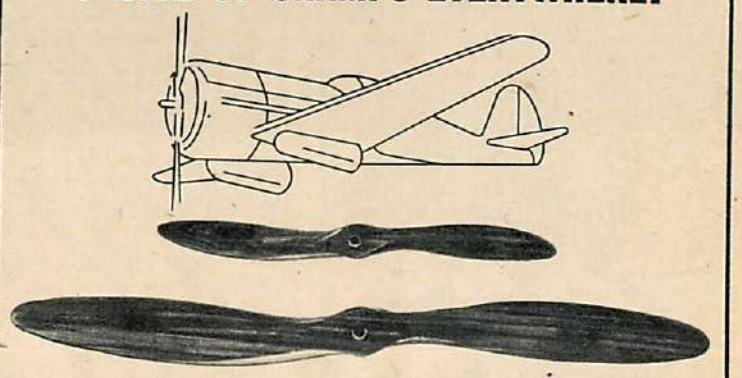
The nine motorless troopships hold their original positions. The copilot of each ship has been studying the maps given to him by the officer just before the take-off. He now gives the man at the controls the correct compass course. They are to fly a 290-degree course for fifteen minutes and then make a right turn and head

(Turn to page 48)

CAPT. RICKENBACKER CONGRATULATES ANOTHER WINNER USING Flo-Torque!

Capt. Eddie Rickenbacker, world famous flyer, presents Rickenbacker Trophy to Harry Forsyth on October 5, at Elkins, W. Va.

THIS 20% MORE EFFICIENT PROPELLER CHOICE OF CHAMPS EVERYWHERE!



SPEEDIER-FASTER CLIMB GIVES CHAMPS SOMETHING TO TALK ABOUT!

Yes sir, fellows, the famous Capt. Rickenbacker congratulates Harry Forsyth, winner of Rickenbacker Trophy; and everyday consistent winners throughout the nation depend on Flo-Torque propellers where competition is keenest. But here, let Harry Forsyth tell you in his own words.

" Win with a Flo-Torque" has been my slogan ever since I started using Flo-Torque propellers. I have found them far superior to any other props I have ever used. Regardless of the motor I am using, if it is turning a Flo-Torque I feel very confident that the plane will give maximum performance.

"I have placed high in contests at Morgantown, W. Va., Elkins, W. Va., Butler, Pa., and Waynesburg, Pa., also have had many excellent flights while flying for sport."

. . . So if you want to rub elbows with big time winners, equip your planes with precision built Flo-Torque Propellers.

NEWS FLASH!

NEW "INVADER" SETS HIGH STANDARD OF QUALITY IN LOWEST PRICED PROPELLER FIELD!

ONLY 15¢

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The well known "FLO-TORQUE" has made a sensational reputation of being America's most efficient gas model propeller; and now we are putting this efficiency in back of our new, lower priced propeller, the "INVADER."

Manufactured of straight close grain white poplar, wood noted for its durability. Precision machined with workmanship and design to give its users utmost satisfaction.

SEE THIS NEW LINE OF PROPELLERS NOW!

Distributors—Jobbers—Dealers—
Overcome competition in your home territory!

FLO-TORQUE

3150 Clybourne Ave., Chicago, Ill.

Glider Troopships

(Continued from page 46)

on a twenty-degree course to their objective. The landing will be made in the fields of territory familiar to the pilots, for they have lived in the enemy country prior to the declaration of the war. From 13,500 feet it will take the gliders close to an hour to reach the landing spot. The sensitive altimeter unwinds slowly as the pilot nurses the craft down at its minimum sinking speed, constantly watching the variometer and not allowing the ship to sink faster than four feet per second. In fifteen minutes they are down to 9,800 feet and the course is changed to a compass reading of twenty degrees. So far so good; their silent flight has not been noticed by the enemy. Another thirty-five minutes go by and only 1,000 feet of altitude is left. The pilot tightens up, his face strained. In four minutes the ship will lose all altitude and it will be up to him to make a safe landing in the pitch dark. He cannot see obstructions like trees and fences until he is almost on top of them. Only by his sensitive altimeter can he tell how close the ground is. At five hundred feet he executes a wide turn to the right, which gets him presumably into the wind, according to the meteorological data jotted on the map. A couple of dark objects pass below his right wing. Trees. The sensitive altimeter's large hand shows less than a hundred feet left.

The soldiers in the rear have taken their rifles out of the clamp racks; their hands are by the zipper, ready to open the doors the moment the ship lands and stops rolling. The glider pilot reaches for a lever and opens the spoilers; the ship's nose drops slightly, its sinking speed increases sharply and the glider touches the ground, bounces slightly up and settles back. The pilot quickly applies the brake, the machine stops with one wing touching the earth. In the same moment the soldiers pile out, carrying their gear, and dynamite is unloaded from its special compartment. All other gliders have landed safely in the neighboring fields. The men meet at a predetermined point and are soon on the way toward their objectives.

The above account is not based on any incident which has occurred in the present war. To our knowledge, at the time of writing, gliders have not been landed behind any lines at night. However, constant rumors have been circulated that Germany has used glider troopships on at least two occasions, and that England sees a possibility of their being used again if Germany decides to invade. Let's discuss the feasibility of motorless troopships only from an engineering standpoint. Not being military men, we will let the war strategists decide as to their tactical value. However, we do think that they may be more useful than parachute troops. First, because they can be released some forty miles from the objective and glide silently down to it, while parachute troops have to bail out in the immediate vicinity, attracting a great deal of attention because of the noise made by the troop transport planes. Secondly, because a parachute soldier dangling from his shroud lines is at the mercy of any ground sniper, while the glider can maneuver around, and with a light machine gun mounted in its nose, can inflict considerable damage on the same ground snipers.

Glider trains are not new. Neither are multiplace gliders. Russia built a number of them as far back as eight or nine years ago capable of carrying sixteen people. The same country has towed as many as ten sailplanes behind one twin-engined bomber. Here in the United States, four Franklins have been towed behind one Taperwing Waco at Elmira, N. Y. A glider train piloted by R. E. Franklin, Jack O'Meara and Stan Smith made a flight from New York to Philadelphia. And we mustn't forget Frank Hawks' flight from California to New York in his *Eaglet* glider. In the way of multiplace ships, remember the Gross four-place glider built in Akron, Ohio, in 1933? It flew very nicely, too. We do not even mention all the two-place ships which have been recently built in quantities over here. The size and seating capacity of such ships are restricted only by the demand for them. From the engineering standpoint they have no limitations.

What, then, will a ten-place troop glider be like, and what will be its performance? It will be a cantilever high-wing monoplane, possibly of metal construction, giving a wing span between seventy-two and eighty feet, with a wing area of 420 to 465 square feet. The fuselage will be thirty-five feet long. The ship will weigh empty approximately 1,200 pounds and have a gross weight of 3,200 pounds. The wing loading will be between seven and eight pounds per square foot, giving it a sinking speed of three and six tenths feet per second. The gliding angle will be 23:1. The seating arrangement will be ten, side by side, with possibly four doors to facilitate quick exit to the soldiers. The ship will be equipped with dual controls, air-speed indicator, sensitive altimeter, bank-and-turn indicator, variometer and a clock.

In order to keep within the limits of weight allowance, the soldiers transported in these glider troopships will have to weigh not more than 140 pounds. Their equipment, then, can weigh as high as sixty pounds per man; most likely it will not exceed forty pounds. By increasing the pay load, the wing loading goes up, and so does the sinking speed, which naturally cuts down the performance of the ship. With a wing loading of eight pounds per square foot, the sinking speed of this ship will be three and six tenths feet per second. In still air, and from 12,000 feet, the glider will descend to the ground in fifty-five minutes; with the gliding angle of 23:1 it will cover fifty miles —under ideal conditions.

So in conclusion we will say again that the silent troop-carrying ship is quite feasible, and before the war ends we may hear more of them.

Welding For The Future

(Continued from page 16)

that in the factories. Every man punches in and out on a time clock, tool checks are issued for special tools, requisitions are necessary to obtain material from the stock rooms and time must be kept on each job.

Following my introductory lecture, the tool-crib attendant issued me a complete set of tools which are included in the cost of my tuition and become my property upon completion of the course. The tools are the best obtainable and include a heavy-gauge steel tool box, a set of files, end nippers, pliers, ball peen hammer, two "C" clamps, goggles, a torch, six tips, six cleaning drills, a lighter, a wire brush, a hack saw and gloves.

Armed with the tools of my new trade, I reported to the welding shop, where I was introduced to Vern Orenduff, chief welding instructor, who many of you may remember as a famous dirt-track race driver in the early '30s. Mr. Orenduff gave up this thrilling and dangerous sport a few years ago to follow his trade, welding, in which he's had years of experience. I elected to take oxy-acetylene welding on steel. Others in my class are learning to weld aluminum. Although we are placed in an atmosphere of being actually at work in a factory, we are shown every consideration. Each weld that we make is inspected by the instructors, and we are graded accordingly. We are not learning to weld by theory, but are actually doing the same work we will be doing when we get a position in a factory. Experience is our teacher.

The welding schedule at the Faust School includes instructions in the care and setting up of apparatus, lighting and handling the torch, lectures on the flame, oxygen and acetylene, ripple welding, butt, tee, lap, vertical and backhand welding and tube joints. The last hundred hours of the course are spent in practicing the army and navy welding tests.

The one thing that has been impressed on me from the day I entered the school was "honesty in your work." This is best explained by quoting from the reference manual: "One of the most important characteristics of a welder is honesty. It is very easy with a torch to gloss over a defect, to include particles of slag in the weld, or to weld over the surface and not penetrate to the full depth of the metal. Such practice means but one thing, a weak, poor weld which will probably break in service and which may cause accidents or even deaths. A man who is content to gloss over the surface and who will not take the time or the trouble to use the best skill he can attain to make a sound, honest weld might better stop right in the beginning and take up some other trade, rather than continue with a process which requires honesty and conscientious workmanship."

I have found this to be good, sound advice, and I have a hunch that if I combine this principle with the skill I am attaining I'll find my place in Uncle Sam's national-defense program.

Among the first things that I learned were the care and precautions necessary in the use of oxygen and acetylene in welding. Oxygen is a gas compressed until it is confined in the space within the cylinder. This space within the oxygen cylinder amounts to only a little more than one and a half cubic feet, and it will readily be appreciated how much the oxygen must be compressed to confine 220 cubic feet within this small area. All oxygen cylinders are manufactured and tested to comply with the rules of the Interstate Commerce Commission. They must be handled with care.

Acetylene is an entirely different gas from oxygen. It has characteristics which necessitate different treatment when it is compressed into cylinders. The acetylene cylinder is completely filled with a porous filler like a sponge. This filler is in turn completely filled with a liquid called acetone which dissolves acetylene. When acetylene is compressed into the cylinder it is dissolved in the acetone and under these conditions it is safe for shipment and use.

Right at the beginning I learned to take good care of my apparatus and equipment. The pressure within a cylinder is too great for use at the torch, and for this reason it is necessary to use regulators to control the flow of the gases. Both oxygen and acetylene regulators are very carefully designed and constructed to meet the severe service imposed on them, but it is necessary to keep them free of grit and dirt.

The torch is a simpler piece of mechanism than the regulators, but even so it must be properly cared for. The mixing chamber in the brass section must be free from dirt. The seat of this brass mixing section where it enters the torch handle must not be nicked or scored, and the threads must be protected. The port or hole through the copper section of the tip must be kept free from dirt, oxide or slag or the tip will not work properly. This is done by cleaning this port occasionally with a drill to fit the port.

The small, very hot flame produced by the welding torch is the result of the complete combustion of pure oxygen and pure acetylene. It requires two and a half parts of oxygen to consume completely one part of acetylene. It is not necessary, however, to supply all of this oxygen through the torch because a portion of the oxygen is derived from the air surrounding the flame. The torch, therefore, is designed to supply one part of oxygen to every part of acetylene which passes through it, and the flame obtains one and a half parts of oxygen from the air surrounding it to complete the combustion. The temperature of this flame is about 6,300 degrees Fahrenheit.

After I master steel welding I expect to continue my studies by learning to weld aluminum, which requires a special technique. The melting point of aluminum is about 1,225 degrees Fahrenheit. There is no color change when aluminum is heated

from room temperature to its melting point. Therefore the welder cannot judge the temperature by color as is possible in welding steel. The welding of aluminum parts in aircraft construction is rapidly gaining favor, since it reduces weight.

Other fellows, like myself, are learning welding, riveting, assembly, sheet metal and steel detail work at the school. They range all the way from eighteen to fifty-six years of age. One of them is an undertaker's helper, another was a butcher, another a brokerage clerk from Wall Street, and still another was a longshoreman. We are all anxious to get started in the aviation industry, and we think we're going about it the right way—learning by doing.

Shell Spotters

(Continued from page 20)

he knew that should his cruiser be hard pressed she could never stop to hoist him aboard! The best they could do—if they would—was a diminished speed pick-up called a "cast" recovery.

From long practice, he estimated the range. "Range 20,000 yards," he radioed back to the ship. The first two salvos were to try for lucky hits and to check the range accurately, and he waited a few seconds, his eyes glued on the blue sea and the toy ship below. Then nine splashes rose from the sea short of the enemy vessel, then nine more: 500 yards short and 200 yards to the right; like a flash he radioed back to the cruiser:

"Up five, up five; left two, left two."

Back aboard the cruiser, men were busy loading black, yellow-tipped projectiles—armor-piercing, high-explosive shells—into the breeches of the eight-inch guns. In a room called "plot," officers were busy putting the third salvo corrections of temperature and ballistic computations into the range finders. In the turrets men were making the pointers on their guns match the pointers that came from "plot." At the firing station an officer watched two crosshairs in a sight; when they met the horizon he squeezed an electric firing button. The three turrets roared, and the cruiser shook as the big guns vomited flame and smoke.

Seconds later, nine more splashes rose from the sea. The pilot now had a salvo beyond the battleship, and this made a "straddle." But as he looked down he noted a plane taking the air, catapulted from the enemy craft, and shortly afterward the black smoke of shellfire curled to windward. Company was coming up! Quickly he radioed back.

"Straddle! Down two, down two; no change, no change."

A few hits now would put the heavy, cumbersome battleship at a serious disadvantage. Just a few minutes longer, and a broadside would take her for a ride to the bottom. As the pilot waited he signaled the observer to be ready for company, and to get the guns warm. Never nice to be inhospitable to guests, invited or not!

But if the enemy aircraft drove him away, the battleship could turn and the cruiser would be unable to see or shoot. It was essential that he stay on the job regardless of enemy planes until a salvo scored direct hits, thereby putting as many turrets as possible out of operation. The pilot watched for the third salvo.

It was not long in coming. A heavy explosion rocked the battleship for a direct hit. But the enemy was now turning, attempting to get out of range. He might also change speed, making the problem more difficult. And to make matters worse, the enemy's aircraft would molest the pilot any minute, trying to blind the guns below.

The pilot radioed the information back. There were eight more scouts aboard the cruiser, and some of them undoubtedly would be catapulted off to take his place if he were shot down. Once in the air they would stand as little chance as he of getting back aboard during battle, unless, of course, a decisive victory were won before the fuel tanks became empty. At lean mixture and half throttle, the SOC could cruise for only eight hours.

Suddenly the observer shook the stick. Pointing back, he indicated that the enemy aircraft had reached their altitude and was maneuvering for position. With both fixed and free machine guns ready it might be possible to fight him off, but meanwhile the cruiser would be waiting for reports about the shell splashes. Grimly, the pilot motioned to his observer: "Take care of the enemy plane!"

The fourth salvo already geysered when he looked down. All splashes were off in deflection but satisfactory in range—the zigzagging had been too good. But now the battleship was moving slower and she appeared to be down at the bow. One more salvo would do the trick, and he radioed back, "No change, no change; left two, two."

A rattle of machine-gun fire startled him. He looked around to see his observer slumped in the cockpit, and an enemy scout zooming away. This time it would be a fight, and charging the fixed gun, the pilot pulled upward. A fight at full throttle might use up his gas, but it was a choice between fighting now or never fighting at all.

On the next attack the enemy found him ready. When he saw the enemy plane dive, he pulled around quickly, turning with him. Then as the plane roared past, he slammed on full throttle and dived, picking up the fuselage and tail in his sights. Quickly squeezing the trigger he watched the tracers rip out, curving and dropping into the tail, the fuselage, the cockpit and then the motor. With satisfaction he noted the black smoke start to spurt out—and the plane whipped into a spin.

His own battle taken care of, the pilot looked below. The enemy fleet was disposed in a far-flung line, and

to one side wallowed a smoking, burning hulk that once was a battleship. As he watched, a terrific broadside of the cruiser's nine eight-inch guns hit her; miraculously the ship seemed to lift from the water. There was a geyser of flame, smoke, water and ship, that floated silently up, to sink back as noiselessly and disappear in a a foaming, churning mass. A chance hit had struck either boilers or magazine or both!

As he radioed the success of the battle to the cruiser, the pilot closed his throttle and glided back. Although the fleet participation was not over, his own job was done. Now to get aboard—if he could—before the fuel supply ran low. But to stop a cruiser in midocean was just like inviting a lurking enemy sub to a cruiser feast. It was very likely that she would refuse to stop. Then what?

As he wondered, he looked for the cruiser. Among other cruisers and battleships it would be hard for any other pilot to tell which ship to go back to. And if his own ship didn't want him, certainly the others wouldn't! The pilot knew what to look for: a ship with a large, "pig-stick" mast, a kind of a stack-and-a-half with a "birdbath" or standing platform on the mainmast.

Flying at 3,500 feet he looked down, watching in addition for the red squadron color on the forward No. 2 turret and the white section color on the No. 3 turret. That would be definite designation, because no other ship in the fleet was marked with those colors. And looking carefully, he spotted her. She was set for a cast recovery.

A cast recovery meant that she wasn't going to stop! It meant that he would have only one chance to get aboard—and only one—because in the heavy seas that were running it would be impossible to take off again after he had landed. It meant that he would have to land within a very, very small area and taxi up to the ship immediately, hooking his plane aboard a raft that was a guarded naval secret.

But to hook the plane to the raft meant that he would have to taxi swiftly toward the moving ship as soon as he landed. And taxiing a seaplane in a high sea was almost impossible. The plane would pitch, causing the propeller to bite into the salt spray, pitting it, slowing it down, and wetting the ignition harness.

The only way it could be done was by means of a "slick." The cruiser herself would have to form the "slick" water by turning thirty degrees out of the wind, then turning ninety degrees back across the wind. Her forward motion, as she skidded through the water, made a slick surface upon which the seaplane could land. But there was one serious drawback. If the plane did not sit down immediately, not only would the slick surface be gone due to wind and waves, but the ship would move swiftly away at her usual rate of speed.

And once on the water the seaplane could not again take off.

The pilot could not take off due to the high seas and waves that would bash in the comparatively frail pontoon as the plane raced from crest to crest. At sixty knots water is very, very hard.

But now the question remained: Would the ship take time to make a slick, and slow down enough for him to catch her? It meant an impossibly huge sacrifice in time of war, and if the battle was hot, and the ship under fire, he would simply have to circle until his fuel ran out, and then—

Suddenly, the signal came to prepare to land. The ship turned out of the wind thirty degrees for a short distance. The pilot closed his throttle and glided down into position. Now if ever, that position must be perfect—it was a case of doing it right the first time, or never again. The plane had to be landed on the slick, as close to the ship as possible, and that called for a precision landing the like of which had rarely been seen.

The cruiser started her second turn. Already the water was smoothing out astern: not a ripple or wave appearing. The water was as smooth as a mill pond for a space of a few hundred feet. It was crescent shaped, like a new moon, extending along the curved path of the ship as her huge bulk went forward through the water while she turned.

Astern, the pilot held his plane aloft at stalling speed. Nose up, he flew close to the choppy waves, holding the stick back, but flying so slowly that the plane didn't climb. The huge rolling troughs passed beneath, any one of them large enough to rip the pontoon of the seaplane in two.

Now the cruiser was turning again. It was time to land, time to be taxiing up to the floating sea carpet that would take him aboard. The pilot carefully gauged his distance: so much depended upon his accurate estimate of space. In a few seconds the slick would be gone, but still he must bide his time in order to land close to the stern of his ship. He pulled the nose higher, easing more throttle to his engine. In such a position he could drop the seaplane on the water at any time or place he chose.

Suddenly he closed the throttle. The engine quit, the propeller idled, and, without a sound, the SOC dropped in a fully stalled position to the water. It hit hard, but stayed put. Almost immediately the pilot opened the throttle and, using his water rudder, steered straight for the cruiser. His pilot's eye told him he must hurry, because taxiing a plane fast enough to catch the ship was a critical job. He searched for the secret sea net, found it, and closed the throttle.

The hook from the crane dangled overhead, and he climbed out of his seat to get it and insert it in the hoisting sling. He threw a wing line to the handling crew, then watched them hoist the 5,000-pound plane aboard and safely hangar it below.

There would be night flying—night catapulting—a little later. Stiffly, with weary legs, he clambered down the ladder to his room. The ship rolled suddenly, catapulting him into his bunk. You fly all day and all night—and like it—when you're the eyes of a cruiser!

Water Preferred

(Continued from page 15)

and said, with an easygoing smile: "Why, sure, all you need is some water taxiing, a few take-offs and some landings and you'll be all set." We weren't quite sure at the time whether he said "set" or "wet."

First, we learned to swing the propeller from the rear instead of the front, which seemed easier to us and less dangerous because we could hold onto the ship with our left hand and consequently did not run the risk of falling into the whirling blades. After leaving the dock we practiced water taxiing, which is quite a bit different from land work. Now, we're as much at home on water as on land, but at that time had our doubts as to whether we would ever learn to remember about the effect of tide and wind and the tendency of the ship to act like a sailboat. Mr. Barone showed us how to taxi up- and downwind with the flippers, or elevators, in an up position so that the noses of the floats would not "dig" and throw a lot of spray into the propeller. (The suction on the float bottoms keeps the wind from throwing the ship on its back when taxiing downwind with the elevators in this position.) In demonstrating turns on the water our instructor informed us that more capsizing accidents occur from incorrect technique in turns on the water than from any other cause. He demonstrated a turn from a downwind position to that of an upwind. We learned that by merely throttling the engine back to idling the ship "weathercocked" of its own accord around into the wind just like a weather vane. Mr. Barone was very emphatic about not using power in a turn of this sort because of the danger of capsizing. If power is applied while turning to an upwind position the ship has a tendency to skid on the water, and in so doing may dig the outside float under the water with the result that you will go swimming fully clothed unless you are a proficient quick-change artist. We found that turning a seaplane from upwind to downwind is practically the same as with a landplane except that more power may be needed because of the tendency of the ship to slide over the water. The centrifugal force set up by applied power in a turn of this sort is, of course, counteracted by the wind blowing against the "outer" side of the ship. Once in a downwind position only enough power is then required to keep the ship from weathercocking back to its former position.

In taxiing downwind for our first take-off, we learned that we were to use conventional aileron control rather than cross control which one sometimes needs to use when taxiing a landplane in a quartering downwind. The ship is kept from turning to an upwind position, or weathercocking, by applying enough throttle to blast the rudder and tail into the desired position.

We found that the initial take-off procedure is the opposite of that for a landplane. Instead of pushing the wheel forward to get the tail up it is necessary first to get the tail down so that the floats will be in a position to nose out of the water. As the ship attains more speed the floats come higher and higher out of the water and finally the wheel is eased forward so that the ship will "plane" on the steps of the floats. Only when the ship is riding the steps of the floats is it able to attain flying speed, due to the drag set up if any other part of the float rides in the water.

Landing technique is about the same as used with a landplane except that you try not to "drop the ship in" as is often done with landplanes. Seaplanes have no shock absorbers and in vertical contact the water feels as hard and unyielding as ground. If you are a swimmer and have done much diving from a high board this will probably have been apparent at times. The preferred way to land a seaplane on rippled water is to bring it in with the tail just a little higher than is customary with land jobs and allow the steps of the floats first to contact the water in a skimming glide. The drag thus set up by the passage of the steps through the water will pull the ship down to a nice silken-smooth landing that makes one doubt the ship is actually on the water. What a feeling!

Landings on very rough water are hard on the ship and floats and should be made by bringing the ship in on power with the nose high and allowing the heels or tails of the floats to drag through the crests of the waves. This breaks the speed of the ship and allows the floats to mush into the water without creating a high impact force which would occur if the plane were landed in the conventional manner. Dragging the heels through the crests also minimizes the possibility of digging the fronts of the floats under a high wave with the resultant capsizing of the ship.

Glassy, mirrorlike water which is often encountered on sheltered lakes requires more care and a slightly different technique in making landings and take-offs. Depth perception suffers when judging altitude above this type of water and it is usually necessary either to come in on a flat glide with sufficient power to retain flying speed until contact is made, or to drop some object onto the surface that will float so that you can judge your height. A life preserver seat cushion will serve the purpose well, but since this is rather costly, we recommend you rescue the cushion after landing.

Take-offs from glassy water require more skill than is needed in working from rough water, because the lack of ripples or waves makes it almost impossible to break the suction back of the steps. The usual procedure is to attain as much speed as possible and then by use of a little reverse control lift one float from the water, drop it back on the water, and at this moment try to get the other float up off the step and clear. In some cases it may be necessary to make several attempts of this type before a take-off can be effected.

We'd heard from many landplane pilots who had done some seaplane flying that a seaplane flew rather sluggishly in the air in comparison with a landplane of the same type. Of our own experience with the two, we would say that there is little difference. Of course the seaplane is slower because of the added parasitic drag of the floats, but this amounts to so little that it is not worth worrying about. In aërobatics the water job responds just as smoothly and quickly as its land counterpart. We did find that some seaplanes will not slip as steeply as a landplane of the same type, but this bothered us little as we do not particularly like exaggerated ships that make you think the ship has shed a wing. One other thing worth passing on is the need of a little more prudence in the use of the engine in taxiing than is usually used by many inexperienced seaplane pilots. Due to the drag of the floats, more power is needed in taxiing a seaplane to the ramp after landing than is required to taxi a landplane from the runway to the hangar. Because of this the engine of a seaplane has a tendency to overheat due to the poor cooling attributed to the slow speed of the ship in taxiing through the water. To overcome this overheating and resultant repair bills brought on by bent, burned and stuck valves, we recommend that the engine be idled for a period of five minutes after docking so that it will again attain normal operating temperature before being shut down.

All this technique may sound a bit complicated at first, but we are sure that if you start flying seaplanes you will be enthusiastic, just like an unair-minded friend of ours who has a hunting cabin 'way up in the mountains. His place happens to be less than a quarter mile from a lake, and we flew him up there recently. As he got out of the ship and turned to say good-by, he announced, "These water flivvers are sure handy. Guess I'll have to get one myself."

Same here, when we get some dough.

The Herald

(Continued from page 28)

the 18" of tubing projecting out of the two halves of the balsa boom. The tubing can now be slipped into the holes in Formers G, H and J. The butt of the boom should fit squarely against Former J, and keels should run along the sides of the boom. The boom should be round from a point about two inches from the front end of the boom to the front of the stabilizer where the boom is flattened to retain the stabilizer rib.

The bottom of the boom is then tapered up to a point at the rear. When the boom has been cemented in place you are ready to start planking. The planking is done with $\frac{1}{8} \times \frac{3}{8}$" very soft balsa. Start the planking by putting a strip on opposite sides of the fuselage, pin down in front and fend them in at the same time at rear. A small rubber band will help hold the planking in place at the rear. Be sure that the fuselage is kept straight as the planking is put on. When you have finished the planking, if you have access to a lathe you can mount the fuselage in this and sand down to about $\frac{1}{16}$" thick; if not, you will have to use good old elbow grease to sand it. Next give the fuselage three to five coats of clear dope, then cover with strips of tissue about $1\frac{1}{2}$" wide. Give it about three more coats of clear dope, then put it away and start on the wing mount.

The wing mount, which is given full size, is made from three layers of $\frac{1}{16}$" hard sheet balsa. The grain in the center piece should run up and down while the outside layers should run at a forty-five-degree angle to the center piece and at right angles to each other. You can now cut to the exact shape and sand to a streamline section. The mount is then cemented in place on the planking and directly over one of the keels. A straight pin may be pushed through the planking near the rear of the mount to be sure that you have the mount directly over the keel. When the cement has dried you may make a small fillet between the mount and fuselage with a piece of planking wood which you have left over.

We can now make the stabilizer which can easily be done full size from the dimensions given on the plans. It is made from medium-soft $\frac{1}{8}$" sheet which is cut to shape and sanded streamline. It should be about $\frac{3}{32}$" at the thickest point when you have finished. This is then doped and covered with red tissue, or the color you intend to make it, as no colored dope is used on the tail assembly or wing. The rudders are made from medium stock of $\frac{1}{16}$" sheet. One of the rudders is given full size so you will not have to draw this up. The rudders are also covered with tissue. The rudders should be cemented to the stabilizer before the stabilizer is bent over the center rib. The center rib is given full size on the plans. The center rib is cemented to a small flattened place on the boom before the stabilizer is cemented to it. Be sure that the tail assembly is lined up straight with the wing mount.

The wing is next. You will have to draw the wing full size, but since the curved tip is given full size, you should have no trouble doing this. The ribs are all made from $\frac{1}{16}$" medium balsa. All spars and the leading edge are made from hard $\frac{1}{8}$" square. The trailing edge is medium hard $\frac{1}{2} \times \frac{3}{16}$". The leading edge is covered with $\frac{1}{32}$" sheet balsa. The small false ribs which are made of $\frac{1}{16}$" sheet and are $\frac{1}{8}$" deep are placed only on the bottom of the wing, as the sheet balsa takes their place on the top of the wing. The $\frac{1}{8}$" sheet is placed between and on one side of the spars where there is a break for dihedral. When putting

the dihedral in the tips the trailing edge should be raised about a quarter inch higher than the leading edge. This measurement should be made at the leading and trailing edge of the last rib. $1/16$" sheet is placed between the center and the front rib on the bottom of the wing. The wing is covered with tissue or Silkspan if more strength is desired.

The platform for the wing to rest on is made from $3/32$" sheet. It is cut to shape first, then pinned to the bottom of the wing to dry. Be sure that it does not stick to the wing, for it must be removed when dry and cemented atop the wing mount. When it has thoroughly dried you can dope and cover with tissue.

The firewall is made from $1/8$" plywood and is held in place with three small bolts and nuts placed 120 degrees apart. The nuts should be cemented securely to the back of the first former so that you can remove the firewall easily. The firewall should be $3/8$" diameter.

The cowling will have to be made to fit the particular motor which you use. Two scrap blocks are first cemented to the motor mount sides, followed by a center piece which fits between these blocks at the bottom of the fuselage. When the cement is dry, use sandpaper to achieve the desired contours..

A full-size side view of the ignition tray is given on the plans. The basic part is the $3/8$" dowel to which everything is fastened. Use rubber bands to hold all the parts in place, but after the ship has been flown and the c. g. checked, they can be bound in place with thread and cemented. Note that the rear end of the $3/8$" dowel is pointed so that it fits into the aluminum tubing extending forward from Former G. The landing gear is bent to shape directly over the plan and then fastened in place with a clamp formed of .040" aluminum or dural. The method of mounting the landing gear is up to the builder, however, as many have their own ideas on this unit.

You can now color-dope the model and put three to five coats of clear dope on the wing and tail surfaces. The ship should be made to climb and glide in left-hand circles. When you have made your adjustments you can cement them in place and not worry about them changing.

This ship can be made to look exceptionally good with very little trouble, so let's work a little harder and make this model one that you will be proud of.

The Challenger

(Continued from page 40)

The camouflage paint job is easy to duplicate, and what could be more stylish? Ivory is the background color with grayed-orange, grayed-green, and blue-black being splashed in at random. And $1/8$" black lines separate the color patterns.

Test-glide the model, moving the battery if necessary to produce a smooth glide. First flights should be made under low power until the model is fully adjusted. The original model climbs in fast, left spirals and glides in larger spirals to the right.

Clodhopper

(Continued from page 37)

ing edges may be shaped roughly to the correct cross section before pinning them on the plan. Insert the ribs and attach the bamboo tips, preformed by heating if possible. Remove the frames and cut apart for dihedral. Rejoin them, reinforcing the breaks with $1/16$" hard sheet balsa gussets.

Go over the entire framework with sandpaper to remove any bumps that destroy the smooth lines of the model or spoil the covering job. Form the strut-assembly parts of .028 piano wire. Cement the clip in the bottom of the fuselage and pivot the struts to the trailing edge of the wing with small fittings.

Cover the model with colored tissue, using either double covering or Silkspan on the fuselage to take the twist of the fully wound rubber. Dope the covering to the bottom of all the wing and elevator ribs to maintain the airfoil section. Spray lightly with water and apply two coats of dope when dry.

Make up a motor of fourteen strands of $1/4$" flat brown rubber and lubricate it thoroughly. Slip it in the fuselage, hanging the rear on a $3/16$" hardwood dowel. Attach the tail unit with a couple of rubber bands and balance to find the center of gravity. If it should come very far from the position indicated on the plans, it will be necessary to add a bit of weight to either end to bring it within reason. Cut slots for the spar stubs with the bottom of the front one $5/8$" and the rear one $13/16$" from the top of the fuselage. Hang the wings in place and pull a rubber band through the front slots to hook the leading edges together.

FLYING

The model is now ready for testing. Hand-glide it, placing a sliver of balsa at the top, between the fuselage and tail plug, if it stalls, or at the bottom if it dives. Make the first power flights with about one hundred turns, setting the rudder to circle the ship to the right. Increase the number of turns as you become familiar with the ship, correcting any tendency to stall with a bit of downthrust. Fly the model as often as you can to find its finest adjustment and to increase your knowledge of its launching and flying characteristics in order to get the best performance out of it at a contest.

Flying Fleet

(Continued from page 17)

waves, heading straight toward the enemy vessel, then the huge "fish" is released and they pull up and away and put as much distance as possible between their ships and those of the enemy before the boom comes. All of which sounds rather ticklish, especially in the face of antiaircraft fire, but there is a bit more to it. If the torp is dropped from too high an altitude, it will dive too deep and may "porpoise" in such a manner as to hit the plane. If the tin fish is released when the bomber is too close to the surface, the column of water thrown up by the torpedo's splash may hit the ship's tail—in which unfortunate case the plane may be nosed down into the drink at 250 miles per hour or better.

Hardly less ticklish, and most spectacular of naval air tactics, is dive bombing. The divers are slightly smaller than the torpedo planes, but are somewhat similar metal, low-wing monoplanes powered by radial air-cooled engines. Also, as in the case of the torpedo bomber armament, fixed machine guns are mounted in the ship's cowl and wings, and the rear gunner is provided with a flexible gun. Our fleet is well heeled with superb divers, the newest of which are the Brewster SBA-2, Curtiss SB2C-1, and Douglas SBD-1. Although these prototypes bear the designations of scout bombers rather than those of dive bombers, they are, in truth, more bomber than scout. Although performance data are restricted by the department, these ships are generally admitted to be far superior in all-around performance to any of Adolf's widely publicized Stukas.

The dive-bomber pilot flies on a course which is usually parallel to the enemy ship, just off to one side. Then he rolls the plane over and heads down slightly on his back, beyond the vertical. "Peeling off" the formation, or rolling into the dive, facilitates accuracy because the pilot can, in this manner, keep the target in view. When he noses into the dive, the engine and cowl hide the target until the ship attains a steep angle. He aims the plane directly at the vessel, using the telescope or reflector sight for perfect alignment. The bomb is released and he pulls up, sometimes considerably less than a thousand feet above the sea. Although the Nazi application of dive bombing of land objectives is a new wrinkle, the style of attack was conceived by the U. S. navy years ago. The famous Martin (TM), Great Lakes (TG), and Curtiss O2C Helldiver of a decade ago were the first craft designed primarily for the vertical assault.

Although the aircraft carrier's tactical function is the supply of fire power, means must be provided for the acquisition of enemy information about his location, strength, and movements before that fire power may be directed upon him. This reconnaissance is conducted by the carrier's scouting squadrons. Assisting the mentioned planes in this important work are the somewhat older Vought-Sikorsky SB2U-1 and Curtiss SBC-4. These craft often venture far afield before they spot the enemy warships, report to their commander by radio, and commence bombing with five hundred and one thousand pounders.

The fourth of the carrier squadrons is the fighter complement. These craft are high-performance single-seaters that not only keep the enemy bombers away from their carrier, but carry on scouting work and even dive bombing and strafing sorties upon occasion. Such versatility necessarily demands superb craft, and the new Grumman Skyrocket is the last word in combat planes. This sensational midwing monoplane is reported to have a top speed of 450 miles per hour, and climbs a mile a minute—sixty miles per hour—straight up!

The official designation is XF5F-1, which is not so algebraic as might seem the case: "X" for experimental model; "F" meaning fighter; "5" meaning the fifth type of plane built for the navy; "F" for the manufacturer, the Grumman Aircraft Engineering Corp.; and "1" meaning the first modification. The motors happen to be 1,200 horsepower Wright Cyclones; if others were installed, it would be the second modification, and would be known as the XF5F-2. The Skyrocket's engines turn two ten-foot Curtiss full-feathering, three-bladed propellers in opposite directions so as to neutralize torque, or swinging action of the ship in flight. Standard equipment includes leakproof fuel tanks, two 37-millimeter aërial cannon and four .50-caliber Colt-Browning machine guns, armament being arranged in the ship's nose to afford compact fire power.

Hot on the tail of this aptly named fighter comes the Bell FL-1 Airabonita, the navy's version of the more famous Airacobra. The FL-1 employs the conventional landing gear instead of the tricycle type because of the deck operations and arresting gear used therein. Another sterling shipboard fighter is the Vought-Sikorsky F4U-1, a spot-welded job sporting an inverted gull wing suggestive of the Nazi Junkers and B. & V. Hamburger Stukas.

The seaplanes on battleships and cruisers are for scouting. They take wings from seventy-foot catapults which are operated by compressed air or explosive charges. On completion of the mission, they land alongside to be hoisted aboard by cranes. Newest observation types are the Vought-Sikorsky OS2U-2 and Curtiss SO3C-1, single-float, midwing seaplanes which carry pilot and observer-radioman. These ships are of value because they increase each warship's "visual lane," facilitate maneuvering—the fleet is often strung over miles of sea, with one vessel barely within sight of its neighbor—and maintain radio contact with the plotting rooms of their respective ships to aid in range correction.

The keenest eyes of the fleet, however, are the long-range patrol bomb-

ers. Most famous of these aërial cruisers are the Consolidated PBY flying boats—thirteen-ton craft powered by two 1,200 horsepower radial engines that provide a top speed of 215 miles per hour, carry a six-man crew, are fitted with sleeping quarters and galley, and are so comfortable that the crew lives aboard for days during extended maneuvers. Fleet flagships are the larger Consolidated XPB2Y-2 and the Vought-Sikorsky XPBS-1, which are powered by four radial motors and have cruising ranges of more than four thousand miles with a formidable bomb and arms complement. Like the scout bomber, the big boats can bomb the enemy as well as spy out his movements. Newest of these boats is the Martin PBM-1, a twin-engined gull-wing craft of high performance, of which the NAS has ordered a large number. The flagships and PBM's are fitted with formidable power turrets for defensive purposes.

Before naval airmen are sufficiently skilled to handle these superb high-performance planes, they must, necessarily, undergo a rigid and carefully supervised training routine in slower, low-powered ships. This elementary work is conducted in Stearman NS-1's and navy types known as N3N-2's, both being land biplanes powered by radial motors, though the latter is built at the Naval Aircraft Factory in Philadelphia. Elementary seaplane flying is carried on in Consolidated NY-2 biplanes. To prepare students for transition to service-type ships, they are given flying time in the all-metal, low-wing North American SNJ-2's, or advanced trainers.

Less glorified is the naval air service branch which is known as "utility," whose humdrum activities are highly essential to the smooth operations of the flying fleet. Standard navy transport, the R3D-1 is the military version of the famous Douglas DC-2 airliner. The twin-engined amphibian monoplane, Vought-Sikorsky JS-43, is another transport type. These ships are used to carry personnel from one base to another. The favorite staff plane is the 200-mile-per-hour Grumman J3F-1, which carries eight passengers and pilot. A smaller Grumman utility plane is the single-engined J2F-2 biplane. Both Grummans, like the larger JS-43, are equally at home on land or sea.

Naval air service planes are built to somewhat different specifications than those of the army air corps. Navy designers have more to worry about, in that their ships must incorporate certain features which are strangely peculiar to these craft of the flying fleet. Shipboard planes—all of which have land-plane prototypes—have the smallest wing span consistent with safe flying and landing characteristics because they must be stowed aboard the carriers, where even a two-acre deck is crowded. Planes must be specially stressed to withstand the recoil of gunfire and the strain imposed by deck landing and arresting gear. Special radio equipment and nautical instruments must be provided. Flotation gear—spherical bags which may be automatically inflated from a carbon-dioxide cylinder—rubber life raft (which is inflated in the same manner), and rubber life jacket are essential to keep plane and pilot afloat in the event of forced landing at sea. Emergency rations, Very pistol for signaling, and first-aid equipment are essential. Naval craft are constructed of treated, corrosion-resisting alloys —some of which are appreciably heavier than the metals used in army planes—so that they may stand up under the deteriorating effects of salt water and spray.

American aircraft have more of this, as well as all-around performance, than have the naval planes of any other power; a fact for which we may be duly proud and thankful. Navy wings of chrome yellow to keep our sea and sky clear during the dark days ahead.

Down The Runway

(Continued from page 39)

the annual rules are formulated by the Contest Board of the A. M. A. and wide has been their acceptance since a new procedure was instituted in determining the regulations. Acting under the by-laws of the A. M. A. which were adopted at the annual meeting of the Academy last July in Chicago, a contest board of twenty-two members was appointed. It was this board which was responsible for the new rules under the chairmanship of Bruno P. Marchi.

Once a year all the model leaders who could afford to travel half across the country were in the habit of sitting down, rolling up their sleeves and having a rip-snortin' time formulating a new set of competition whys and wherefores. The annual assemblage was always rounded out by local builders who added confusion to the ordeal and could afterward claim they participated in the "establishing of the official rules."

All that has changed with the growth of the Academy and no longer do aëromodeling regulations emerge from a smoke-filled room after a night-long session. More dignified, more logical, and certainly simpler, is the new set-up whereby the Academy contest-board members put their respective ears to the local terrain to determine what the modelers of their vicinity desire in the way of regulations.

★ ★ ★

According to news drifting into the nation's capital, plenty of modelers are finding the Air Trails "how to start a club" booklet of great help when the boys decide to stop all the talk and really settle down to business and organize a model aëro club. After these groups are set up they are invited to write A. M. A. headquarters in the Willard Hotel, Washington, D. C., for complete dope and applications for affiliating with the Academy as an official chapter eligible for all club benefits. Line forms on left, gentlemen.

Nationals Or Bust!

(Continued from page 31)

to eat in the car. The only trouble with this was that there wasn't enough elbow room for all of us. While Stockwell was dishing up a plate of spaghetti, an elbow shot out and dumped it in Biddle's lap. Somebody had to go, so Stockwell made his exit with spaghetti flying after him.

After dinner we unpacked our planes and set up flying operations. Chuck sent off his new pod-and-boom job, Blitzkrieg. The ship climbed swiftly into the darkening sky. Breathlessly we waited for the motor to cut, but it droned on long after the ship disappeared into the night. The loss of Chuck's gas job did not stop us. Like most crazy model builders, we continued to fly our planes, relying on flashlights to retrieve them.

Early the next morning we found Chuck's gas model about a mile away. Then we started eastward at a fast rate, because we were intent on making the Bonneville salt flats by nightfall. At dusk we were winding down out of the Ruby Mountains in Utah. Suddenly we rounded a turn, and before us lay the vast expanse of the Great Salt Lake Desert. We drove out on the flats several miles, and then turned off the road out onto the hard, white salt. That night we slept in the open in our sleeping bags like seals on an ice field. Once during the night I awoke. The sky was perfectly clear, but the wind was so strong that the straps on the trailer were standing straight out.

By morning the wind had died down, and the sun immediately began to warm things up. The salt flats proved to be an ideal place to fly models. Every inch of ground for a hundred miles provided an excellent landing or take-off spot, but oh, so hard if something went wrong. By noon our planes and materials were scattered in a large circle about the trailer. Chuck's Blitzkrieg and our three Zeniths (Air Trails) were making fine flights, but our times were low due to the high altitude and lack of rising air currents. Ed, however, met with misfortune with his New Ruler (Air Trails). On a full-throttle flight, his New Ruler climbed nearly vertically to about three hundred feet. Suddenly the wing came off and the fuselage, Ohlsson 60 screaming, came hurtling down and demolished itself on the cementlike salt flats. Although the flight was most spectacular, it dampened Ed's hopes of winning at the National meet.

At one o'clock it was so hot that a bottle of oil burst. Our thermometer showed 125 in the shade, and there wasn't any shade. Finally the heat became so intense that we were forced to pack up our planes and push on to Salt Lake City. There we enjoyed swimming in the Great Salt Lake whose briny waters hold you up like a cork.

That evening we found a place to camp in the foothills just east of the city. About ten o'clock the moon came out, so we put out our fire and rolled out our sleeping bags. At this time we began to wonder why so many cars were going by. We were sure that we were not near the main highway. Chuck and Ed decided to investigate. Strangely enough, they found that the cars were parking without lights along the winding roads in the foothills. While they were prowling around one of these cars, two big bruisers, objecting to their curiosity, climbed out and chased Chuck and Ed through the brush. Chuck came puffing back to camp with his pajamas in shreds, but Ed, who ran in the opposite direction, got lost and we had to search for him.

After breakfast we climbed several thousand feet to the top of a mountain where we intended to sail a towline glider out over the valley. All the way up we had visions of watching it sail for miles. However, in spite of all adjustments, the glider would head straight out over the valley and then circle back against the mountain. All attempts to make it go straight failed. Imagine our disappointment in having to take it back with us.

Another day's traveling brought us to the heart of the beautiful Medicine Bow Forest in Wyoming. The weather was wonderful. Not a cloud was in the sky. Just after nightfall we could hear the rumble of a far-off thunderstorm. Due to Wrong Way Biddle's assurance that the storm was going the other way, we did not think that it would be necessary to put up the tent. Suddenly there was a flash of lightning and a clap of thunder, followed by a blast of wind and rain. (All hell broke loose.) Jumping out of our sleeping bags, we wrestled with the tent in the dark and managed to get it up before the worst came. We were about to go to sleep when water began to pour in under the sides of the tent. Dressed in our "bear" skins, we began to dig a ditch around the tent. Much to our disgust, it stopped raining the minute the ditch was finished.

In the next couple of days, enthusiasm for flying began to die off. Most of our planes were in sad shape. Our wings resembled high-pitched props, they were so warped. Fuselages looked like refugees from a duck range, there were so many holes in them. In spite of this, we got down to work again at a tourist camp in Iowa. Most of us spent the night patching holes and running motors just to help the other tourists sleep. Stockwell went to bed early because he had little repairing to do. While he was asleep, Chuck painted his nose with bright-red dope. The next day we nearly laughed our heads off at Stockwell, who was rather puzzled until he looked in a mirror.

One week after leaving Tacoma we arrived at the outskirts of Chicago and spent several hours locating the field. That evening many of the Chicago model builders were on the field testing planes. They looked like an unfriendly bunch. I wonder what we looked like? When they found that we were model builders, we were soon

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slinging the bull with the best of them.

While we were in Chicago we settled in a tourist camp near the outskirts of the city. I will not go into our model troubles, but we had the usual percentage of lost models on test flights. It is remarkable how many thermals you can hit on unofficial flights.

The first day of the contest it took us about six hours to register. Imagine fifteen hundred model builders from all corners of the United States and Canada, all shoving and pushing, trying to get their information kits. That evening we had a great time identifying famous model builders and looking over the exhibits.

During the second day of the contest we met Frank Zaic, one of our favorites in the model field. Intent on making a good impression, I was testing a new cabin job. While Frank was watching, the model spiraled in once and dove in a second time. The funny part was that the model flew perfectly when he wasn't looking.

I will not go into the performances of the models and the procedure of the Nationals because these points were covered in the write-up directly after the contest. But I would like to say that we were greatly impressed by the sight of a whole sky full of models at one time.

The victory banquet at the Sherman Hotel was the highlight of the meet. As we entered the banquet hall we saw a long table covered with magnificent trophies and prizes. Everybody was shouting at once. We sat at a table with five Chicago boys. No sooner were we seated than a firecracker nearly blasted us out of our seats. Firecrackers kept going off all around us, and we became peeved because we couldn't tell where they were coming from. Finally we pinned it on some farmer boys from Iowa. Intent upon revenge, one of the boys at our table emptied a pepper shaker at them. They promptly emptied one back at us. While we were coughing and sneezing, the eats arrived. The waiters really had a job on their hands. Immediately upon setting a plate down, ten hands would shoot out, leaving only a few crumbs on the plate. Competition got so stiff that the fellows went to work on a plate before it hit the table. Anyway, we polished off everything in nothing flat because eating is a speed contest, not an endurance contest.

Right after dinner, things really began to go wild. Some fellows began tying tableclothes and napkins together while waiters scrambled desperately to get control. The master of ceremonies was shouting at the top of his voice through the mike, trying to get order. One fellow was swinging a jug of water tied at the end of two tableclothes while two waiters tried in vain to catch it. After this everybody quieted down and let the master of ceremonies carry on the entertainment and awarding of prizes. At 2 a. m. it was all over except for the scramble for the *Daily Blurb*. The victory banquet made a grand finale for a great National meet which had more than come up to our expectations.

As an experienced—ahem—participant at last year's contest, allow me to suggest the best bets for the coming Nationals. For the master craftsman, Berryloid, scale model, and indoor events present the greatest chance for success. Class A gas also is a good field for expert model builders. All model builders should take a crack at the scale event. By building a good scale job around the two-hundred-square-inch size, it should be easy to improve on the flying performance. If you've got your eye on the National championship, it is a good idea to enter all of the events, but don't count too much on winning in cabin, stick and gas. Chances of hitting the best thermal among hundreds of entrants are not as good as the chances of winning in the highly skilled events.

We made our trip—four thousand miles—to Chicago and back on sixty dollars apiece. This was low because we slept out in the open and cooked our own meals. We regret that we didn't stay at the Sherman Hotel in Chicago, because it took so long to get into the city to attend meetings. Many times when we slept out we wished that we had brought along mosquito netting. Here is a bit of advice to 1941 contestants which was emphasized by our experience on this trip. Register early on registration day and you will save considerable time. Build, test, and pack safely away, long before the meet, all planes which you intend to fly. Don't investigate parked cars. Whether you win or not, I am sure that you will always remember a trip to the Nationals as one of the greatest experiences in your life.

Touring Test Board

(Continued from page 21)

the appointee had real political influence some place. Actually it took no political pull, but it did take a pretty good physical specimen in addition to certain prerequisites as far as college credits were concerned. The waiting lists were tremendously long and the classes were small, making those accepted but a small minority of those making original application. Thus, some priority system had been devised whereby you were placed categorically for acceptance to the Flying Center at Randolph. At the very top of this list were those men, commissioned officers, who had graduated from the U. S. M. A. at West Point or the U. S. Naval Academy at Annapolis. And so on down the list to just about the tail end to where, should you be fortunate enough to have a college degree, you were placed next to last on the list, while if you had but two years of college you were last in line for appointment. Many boys waited years for an appointment, some going to the extent of joining the National Guard which moved them up on the

priority list and expedited their appointment.

A lot of water has gone over many a fall since then, and it might be of general interest to the reader to contrast the changes that have taken place in the system of appointing and training flying cadets. The old program consisted of one year from the time the neophyte, yearning for wings, entered Randolph Field for the first stage of training, known as primary, to the time of his successful progression through the basic stage and finally the advanced school at Kelly and graduation. Now the course of instruction is approximately nine months. The war department has taken nine civilian schools under its wing, letting these schools conduct the primary training under the direct supervision of an air corps officer to insure that it is carried out according to the high standards maintained at Randolph. As this is written, 400 students, new flying cadets, start training at these various primary schools every six weeks.

Let's take a look at the present picture for comparative purposes. Where before the classes were small and hand picked, they have now become large, amounting to the unprecedented number of 1,000 cadets each month. Today there is no such thing as a waiting list, at least in the true sense, for about all it amounts to is a first-come, first-serve list maintained at the office of the chief of air corps, and rarely a month elapses before the new applicant will have been notified to proceed to the nearest primary flying school and begin his training program under the careful and highly competent tutelage of Uncle Sam's air corps instructors. And the training there is not for a few, but for thousands. Mass opportunity, in other words. It is at this point that something new, the flying cadet board, enters the scene.

Having just completed the second leg of a tour as a member of the Traveling Flying Cadet Examining Board from March Field, I can say that the present widespread interest should be broken down and some of the "whys" made understandable. First a word about the board. It is composed of Major Thomas W. Blackburn, air corps, president; Captain Ehrling L. Bergquist, medical corps flight surgeon; Captain Steven V. Guzak, medical corps flight surgeon, and myself acting in the capacity of public relations officer and recorder. Lieutenant Murray A. Bywater, air corps, made advance arrangements for the board. The itinerary, as being followed, covers seven Western States with stops at twenty-eight major colleges and universities of the Pacific coast. The board is delegated with powers direct from the chief of air corps office to interview and examine an applicant physically, and provided he is qualified in the mind of the board, give him an appointment on the spot. This, of course, is subject to final approval in Washington. It is a progressive step over the old system, and probably doesn't mean much to the reader at this point, but a few years back it was necessary for the applicant to travel, in many instances hundreds of miles, at his own expense to take the necessary physical examinations, and then it was weeks, perhaps months, before he was definitely notified of his acceptance and appointment.

Now the applicant knows at once whether or not he is accepted, and the approximate time when he will receive radioed orders from Washington giving him official confirmation in the form of an appointment. From this point on things happen fast. He picks up his railroad ticket (authorized and paid for by the government) and heads for one of the primary schools. If he makes the grade, assimilates and absorbs the fundamentals of how to get an airplane off the ground, around the airport and back down again, the chances are he will have little trouble. However, the majority of "wash-outs" (eliminations) take place during this first three months' period, and thus little of the student's time is wasted. And the government has made only a small investment of time and money. With the present plan in effect those lacking the inherent ability to fly will not be lost—instead they will be trained as navigators and bombardiers and thus become active and vital members of combat crews.

The next three months are spent in basic training at Randolph, and unless the student commits a gross infraction of rules, he is practically certain to continue through to Kelly Field and the final three months of advanced training. During the nine months the cadet is being paid $105 per month, or seventy-five dollars cash with a dollar a day food allowance, and this is mighty good, considering the cadet is still in fact a student.

On graduation from Kelly, the graduate is given the commission of second lieutenancy in the air corps reserve. His pay now jumps to $205 per month plus forty dollars, in case he lives off the post at which he is stationed, or a total of $245 per month. For a young chap coming out of college, this mark will be hard to reach in any field within three or four years after leaving school. And the training received is an open sesame to the aviation industry, should the young man with his shiny new wings decide to enter the commercial field of the business. However, he is offered from one to seven years active duty with a tactical organization upon graduation as a reserve officer, and with an excellent opportunity at this particular time of receiving a regular commission in the air corps. This is to a great extent up to the individual concerned and the effort he exerts in this direction. He is given three years' active duty with a tactical unit at an air corps station. At the end of this period he has an option for two additional periods of duty of two years each, or a possible total of seven years' active duty.

Should the flying cadet dislike the aviation business as given in the air corps, he can resign at any time—the day he arrives at Randolph or the day he graduates from Kelly. There are absolutely no strings upon one, and the training received is equal to or better than that offered elsewhere.

At this point many of you readers are probably saying, "I've been inter-

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ested in a career in aviation for years and now seems the opportune time, but what about the physical requisites needed for qualification?" All that is essential is just a normal individual—no Exhibit A physical specimen is necessary to pass the entrance exam. When I say "normal individual," I should perhaps qualify it to mean just a normal pair of eyes, heart, lungs, and sense of equilibrium. During our tour it was interesting to note the number of applicants who had a fear of flunking the exam because they had heard "it was just too tough." In a number of cases I persuaded boys with glasses to go on and take the exam and they passed. The reason for this is some wear glasses to correct an inherent defect and others wear them merely to lessen fatigue. Don't misunderstand, the exam must be taken without the aid of one's glasses—but the mere fact that glasses are worn by a candidate in daily life does not always mean he has no hope of passing the exam. If you are at all in doubt about this or other points, don't pass up the opportunity of finding out. The chances are you will find the flight surgeon or the flying cadet boards very congenial and willing to spend time in talking out your particular problem. If the answer is no, as far as a career in the air corps, you will find it not in the least embarrassing, and sometimes a suggestion in the right direction will be the means of correcting a defect and you will be able to return and pass on a re-examination.

Many applicants interviewed had the erroneous belief that unless they had engineering experience they would flunk out of the school. Of course this is not true. In my particular class there were many cadets who could be called anything but engineering students. One had studied for the ministry while another had his shingle out practicing law when each decided on entering the flying school. Many others were political science and language majors, and in fact anything but engineers. We did not lose a single student due to deficiencies in ground school, and such is the general rule rather than the exception. In other words it does not take an academic "ball of fire" to get through the prescribed course of study, but just a *normal* individual willing to apply himself and be faithful in his daily preparation and study.

A commercial equivalent in training is not to be found when you compare the costs. In fact, in many cases, flying schools are practically prohibitive—not in value received per dollar spent by the student, but because it takes a long time to gather the "wherewithal" to plank down for enrollment. On the other hand, we find the government *paying* the cadet to learn.

Think it over, and look up the local board convening at your university or college, or write direct to the president of the flying cadet board at your nearest air corps post.

I Saw China Fight

(Continued from page 13)

and messed things up pretty badly. Take Chungking for an example.

Seventy-two to 130 bombers came over every day for ten days straight. C. N. A. C. pilots who circled the city afterward told me that more than two thirds of the unfortunate place had been razed to the ground. There were ten thousand casualties on one day alone. Nobody knows the complete score in China's fighting, but it is thought that there have been over one million casualties.

A few tiffs with the defending Chinese fighters and the Japs devised some cute tricks in tactics. Bombers, alone, are easy meat for fighters. The Japs learned that the hard way, too. They made convoys out of their fighters by attaching sheet-metal belly tanks which could be dropped in a fight. On this reserve fuel the fighters could cruise inland with the bombers. The bombers never came in a straight line. They attacked from all points of the compass. I've seen them deliberately pass up our city, much to the bewilderment of the defending fighters, who were forced to cruise aimlessly until out of gas, and then, after hovering around in the back country, they'd swoop down in force and bomb us unhindered.

It is typical of the Japanese that they are very lavish in their use of bombs. Wherever possible they will circle any Japanese plane that has been brought down and bomb it until only twisted wreckage is left, regardless of whether their own pilots are still in the wreckage or not. I've seen them machine-gun wrecked Chinese planes in the same way, from blind hatred, obviously. I've been in a tight-packed Chinese street when a Jap two-seater swooped down to machine-gun the milling mob. I could see the gunner swinging his gun back and forth. There is no quarter in this war. Or prisoners either.

One of the most outstanding examples of Chinese character I met up with while in China and also one of the greatest epics in the history of aviation occurred when the Chinese government finally decided to move our airplane factory from the Province of North Kwangtung to the Province of Yunnan. Parts of the heavy machinery were moved by train, some of it by sampans. More of it went by oxcarts and trucks, some by hand-drawn carts and not a small part on the backs of coolies. En route some of the machines were set up in matt sheds and even in caves and parts of planes were finished and assembled. In this long, arduous trek by almost every known means of transportation only one small part was lost.

Our Yunnan plant was built in eleven units. How successful this decentralization and camouflaging proved is evident from the unfilled Japanese boasts to destroy the factory the next day. They never hit it, although they came! I don't think they could even see it. I can't, as yet, reveal how this camouflaging was done; the Japs would know what to look for. And production was re-

duced only five percent because of our scattered buildings.

China is hoarding her airplanes. They have worked out what is probably the best air-raid alarm system in the world. Men and women are stationed on every hilltop in China. By calls, by every kind of visual signal they pass the word that the Japanese are coming, their route and probable destination. The Chinese take to cover and their air force takes off and flies to a secret air field. There they wait. If they are not hopelessly outnumbered they receive the word and come raging back to attack the invaders. They are waiting for the day when their numbers will be somewhere near equal to that of the Japanese and then they will strike.

I have heard criticism of the Japanese aircraft carriers. They are said to be small and of doubtful efficiency. They certainly are funny-looking. I got to within a quarter mile of one one night. It had a great, unobstructed flying deck half again as wide as the old cruiser hull on which it was mounted. An open latticework of steel girders supported this deck and you wondered if the whole business wouldn't blow over in a good gale. Now, a carrier's efficiency is mainly the speed with which all its planes can get off and be landed. These boys were plenty hot. They sent thirty-two bombers 270 miles every flyable day, sometimes two and three times a day, to bomb us or the Canton-Hankow Railroad for ten months straight. They had to be good.

I've seen a number of air battles. They were always knock-down-and-drag-out affairs. I recall two in particular. There was the time the Japs laid a trap for the nine Gloster Gladiators we had protecting our plant. Six dilapidated-looking bombers barged up the valley so low that I could have taken a pot shot at the pilot with a six-shooter—if I had one. They cruised brazenly back and forth over the factory. Just when we got to wondering about the Glosters we noticed swarms of Jap fighters high in the sky. The Chinese didn't bite. But the next day the Japs jumped to a false conclusion and sent in six of their best twin-engined bombers without escort. The Glosters shot them all down with a loss of forty-two men in a running battle. The bombers huddled in a defensive formation, but a lucky hit, unlucky for them, touched off the bombs in the leader's plane. The blast spread the formation wide open. Finally, one Gloster, almost out of gas, scooted back, refueled and was off again just in time to cut off and down the sole survivor on its dash for the coast.

On another occasion I watched four Hawks (Type 2 and 3 biplanes) jump an awesome force of bombers and convoy fighters. Hopelessly outnumbered and outclassed in equipment, the Chinese put up a terrific battle. One Hawk and a Jap low-wing fighter fought right down to the ground and at times were firing at each other, inverted, just fifty feet over my head. I'd crouch behind one side of a mud wall while they came toward me, then would dash around the other side when they turned and came back. Bullets thudded in the wall all the time. Curiously, the Hawk made its turns all in one direction and I learned afterward that the pilot had been shot through the foot. Nevertheless, after both had run out of gas he repeatedly tried to ram the Jap. This was typical of the Chinese fighting spirit.

How High Is It?

(Continued from page 39)

to decrease drag. Timing the descent of the arrow is best accomplished with a stop watch calibrated in tenths or fifths of a second. The table given lists the time of fall from three to seven seconds in tenths of seconds, and the corresponding altitudes.

The formula can be used if you ever have a chance to see bombs being dropped. Simplified, it really is: altitude equals 16 X the time squared, i. e., 50 seconds squared is 2,500, so 2,500 X 16 gives us roughly 40,100 feet altitude. Thus, you see, students, if a bomb—or bomber—drops straight down and takes ¾ of a minute to hit the ground, it must have started at a height of 7½ miles. Try it.

Photo Credit List

The following list shows the sources from which credited photos were obtained. Abbreviations: Bot., bottom; T., top; U.L., upper left; U.R., upper right; L.C., left center; R.C., right center; L.L., lower left; L.R., lower right; Cen., center; T.C., top center; B.C., bottom center.

Page 12—Top, International; Bot., International.

Page 14—Hans Groenhoff.

Page 15—Bot., Gordon S. Williams, rest by Hans Groenhoff.

Page 16—All by Drennan.

Page 17—Top, Rudy Arnold; Cent., Rudy Arnold; Bot., Acme.

Page 20—Official U. S. navy photo.

Page 21—Top, official photo U. S. army air corps; Bot., Official photo U. S. army air corps, Randolph Field.

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Page 28—Al Daraghy.

Page 34-35—Rudy Arnold.

Page 36—Al Daraghy.

Page 37—Al Daraghy.

Model Matters

(Continued from page 27)

proprietor with headquarters in his grandfather's locksmith shop at 165 Baldwin St., Elmira, N. Y. Of course, he'll be happy to sell you sticks, but that isn't the only reason he'd like builders to come and see him. He's interested in developing more model activity, especially contests. He feels a city progressive enough to have the title of "Glider Capital of the United States" should have more model flying.

Boston indoor builders were turned out of their armory when the army took over. They moved to Tufts College gymnasium. In Bridgeport the 242nd Division of the national guard moved out of their armory to make way for the city's first indoor contest, if the Bridgeport Aeronuts carry out present plans. So maybe things even up, eh, Cousin Hugo?

It was a beautiful June day in Canarsie, Brooklyn, N. Y., when Bill Poythress brought out his gas job for the first flights. With timer set for forty seconds, it took off without much hesitation and started straight out over the bay toward Floyd Bennett Field. Tender-hearted Bill couldn't bear the sight of his pride and joy going into the drink, so he turned his back. But his suffering was short-lived. Miracle of miracles—the model landed in a rowboat—the only sort of craft for miles around. (Any similarity between this story and the truth is probably coincidental.)

Chicago Riser Riders were organized a few weeks after the 1940 Nationals. The founders of the club still had enthusiasm after spending most of the contest breaking rubber motors—the heat accumulated in the motors and the boys themselves. Armando Sinibaldo is the experimental man in the group. He holds the senior ornithopter record with 2:27.2. His previous helicopter record of 4:16.5 was recently topped by a Boston builder. Walter Savickas is a fifteen-year-old and seventy-four-inch chunk of model builder and the only Riser Rider who placed at the 1940 Nationals—taking third in the junior cabin event. Vito M. Garofalo makes the activities of the Riser Riders sound interesting enough to warrant investigation by all modelers in the vicinity. His address is 1406 West Taylor St.

There's no lack of originality in the names with which modelers tag their clubs—Balsa Butchers, Prop Spinners, Model Manglers, Thermal Chasers, Terrible Torques and Model Maniacs. There are still a few highbrow technical-sounding names left. But these names are long, and everyone refers to them by initials, anyhow. Which reminds us of a clever use of club letters. Barbara Maschin designed a club insignia for the Springfield (Mass.) Model Airplane Club. It showed a parachute jumper landing kerplunk on his stern end with S.M.A.C. printed directly underneath.

C. B. DePuy, chairman of the Al Lodwick Aviation Club of Centerville, Iowa, thinks too many model builders are sissies who stay indoors during winter, stormy weather, and darkness. The boys in their club are tough. They delight in bad weather. It's a challenge to build strong models and handle them capably under bad conditions. They fly models when the wind is too strong for full-size ships. Comes a snowstorm, wheels are replaced by skis. Comes darkness, flying lights are added. Rain or m. high wind or flood, model flying in Centerville carries on.

Model-eating goats with an appetite for balsa are menacing modeling in Bungo Bungo—so writes dear Cousin Hugo. They attend the meets, chase after the models and dispose of them with a few well-placed bites. Hugo says that it's no use trying to save the model because the goats are likely to butt anyone who annoys them. He thinks that in this case, at least, behind the ate-balsa is the safe place to stay.

A modeler from South Australia likes low-wingers. He hadn't done much about it until plans for the Pacemaker were published in the January, 1940, issue. Designers Thomas and Sadler should be happy to know their brain child has been a sensation "Down Under." It distinguished itself in its first contest last year. But even more impressive were some demonstration flights made during an extremely high and gusty wind. Gliders and rubber models were swept off the field. Two conventional gas jobs were tried and wrecked on take-off. The demonstration was intended to spread the doctrine of model building, and the spectators had to be shown—wind or no wind. The Pacemaker was the ship of the day. The model flew perfectly, the Denny howling as though it was trying to top the noise of the gale. After a minute and a half an extra-tall gum tree nabbed it and ended the flight. But the people in Springton had had a demonstration of model flying at its best The writer forgot to sign this interesting letter. His address is The University, Adelaide, South Australia. Would like to know who he is, Australia.

ON THE FIELD. (By Carroll Moon.) One of the first contests of the year which we have had the pleasure to report was conducted by the Model-Airs of National City, Cal., on February 9th—a rubber meet. It was conducted after being postponed a week by rain (California papers please copy) and high time was turned in by Herbert Mills of San Diego, with a time of 10:33. Herb is only fifteen, in contrast to the second-prize winner, Joe Riley, forty-two, who turned in 9:56 for his award. In the junior event Joe Newson of San Diego took first with 4:24. Walt Rinklieb of National City won a special event, his ship being the last to land of fifty planes sent up simultaneously.

The Model-Airs club is two years old and has fifty members. Contests are sponsored on the first Sunday of each month when some seventy-five contestants fly and $17 worth of prizes are awarded for best total time

in three flights. The club has members from all sections of San Diego County and meetings are held in the conference room of Arden Farms, Inc., San Diego. Contests are held in National City. Harold Strawn is contest and publicity director.

The Palm Beach (Fla.) Model Airplane Club (hiyah, California) is another extremely active club in the winter flying area. This organization held a contest during the latter part of December and the Elf Twin proved its class in the A grouping. B. (Pahokee) Alterman of Miami came through with an extremely high-performance ship which turned in a total time of 4:11 to take first place in the class. In Class B, Ronald Geer flew a Phantom-powered Zipper to a 6:57 total. In Class C, H. Silvers did 11:42 total with a Brown-powered Sailplane. Geer only had one flight in Class B, so you figure the time. In the open rubber event, A. Nelson of Lakeland took first. R. Gene Chaille took first in Senior. Every contestant making an "official" won a gallon of gasoline.

The Palm Beach Club was organized in 1938 under the direction of Norman K. Bennett and Wesley B. Jackson. The club has forty members at present. Bob Lewis is president, J. B. Marion is vice president, and Bill Wilson (who tendered this interesting report) is secretary-treasurer. Al Shultz and Joe Tschirgi, two of the club members, attended the 1940 Nationals.

The first gas model contest to be held during the first few months of 1941 in the New York area was conducted by the Sky-Scrapers Club of Brooklyn, N. Y., on March 2nd at Creedmoor, L. I. There were seventy-five entrants. The morning was windy, but there were thermals galore. Jerry Brofman, of the T. A. M. B. E. Club in Brooklyn, took first place after his Super Cyclone-powered Comet sailplane hooked a thermal on its final flight for a 6:05 performance. He averaged 3:02. Most unique ships on the field, although not entered in the contest, were canard-type Class B ships, both powered by Ohlsson 23s, built by George Gilchrist and Ed Yulke of the Sky-Scrapers.

We saw a scaled-down version (nine-foot span) of a Douglas bomber powered by an Ohlsson 60, *and it flew.* Most scale versions, as our builder friends know, plow into the soft earth with startling brutality. However, this one flew in an excellent manner, climbed well, and showed soaring ability. The builder did "crib" a little, using a conventional model airfoil instead of the customary symmetrical foil of larger craft.

We don't know how much our readers know about real contest motors. However, that recently postponed Sky-Scraper meet brought some funny things to light. Among the entrants were fliers with the following "obsolete" motors: two Trojans, a Brat, a 1939 Bantam, three Baby Cyclones, a James and a Husky. To our knowledge the Trojans, Brats, James and Husky motors are no longer manufactured. S'too seemed really hot.

Air Adventurers

(Continued from page 26)

shop called Allied Production Engineers. I am a sort of an apprentice tool designer. I'm just learning the business, having only about 1,000 hours on the board at present. Because of the armament program we have been working sixty-four hours a week for the last couple of months and will probably continue to do so for a long time in the future. Our outfit designs gauges, jigs and fixtures for the Curtiss Aëroplane Division of Buffalo and the Bendix Radio Corp. of Baltimore.

"Things are in quite a state of confusion at present, but are gradually being straightened out. Curtiss is gradually reaching mass production as evidenced by the types of tools used. For example, where previously we would design a die or jig to perform an operation on only one part, the same tool is now being made to perform the operation on several parts at the same time. Tooling up a plant is a tremendous job which can only be accomplished by skilled men, men with at least ten years of experience in tool designing. They, too, must have time. There is no substitute for time and experience these days."

Eugene Weller of Brooklyn, N. Y., has passed his test for his Flight Lieutenancy. Tommy Coughlin of Ottawa, Canada, clicked for his Photography award with a shot taken at the Ottawa airport.

Clark Stevenson of Morris, Manitoba, Canada, is so delighted with Americans in general he wants to correspond with all American Air Adventurers who are about thirteen years of age. Clark is one of our most loyal readers and members on the other side of the border. So you fellows chip in and drop him a line at the above address, will you?

One of our newest Flight Captains is La Mar Garrard of Shelley, Idaho, who came through with one of the best and neatest papers we have marked in months. Francis Moser of Springfield, Mo., is another. Francis wants to become an expert flight instructor. Well, we need plenty of those fellows. Charles Bogdon of Tonopah, Nev., completed his Flight Captain's exam with honors. A smart piece of aërial photography won a Photographer's award for Douglas Kielman of Waukegan, Ill., who managed to get upstairs over his home town in a Piper Cub and snapped it with a Kodak Bantam. We studied it carefully, but couldn't see Jack Benny anywhere in the picture.

An Engine Mechanic award has been sent out to Bobby Mitidere of Brooklyn, N. Y., for his paper on the test. A Photography award went to John Maxwell of Pittsburgh, Pa., for a shot of a navy plane taken at the Allegheny County airport.

Your Flight Commander,

ALBERT J. CARLSON.

Contest Calendar

(Continued from page 42)

Paste onto other section for a complete chart.

DATE	LOCATION	NAME OF MEET	EVENTS	PRIZES	SPONSOR	SECRETARY
August 7	Albany, N. Y.	Capitol District Aeronautical Association Meet (AA)	H. L. & tow-line gliders	Trophies or merchandise		J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.
August 4	Baltimore, Md.	Third Annual Gas Model Meet of the Aero-Craftsmen (AAA)	Rubber & gas	$500 in prizes; spectator award		R. W. Skerett, 1533 Bolton St., Baltimore, Md.
August 4	Atlanta, Ga.	Aero Engineers Seaplane Contest (AA)	Gas R. O. W.; all classes	Prizes and free picnic		W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
August 0	New York City	A. M. A. Record Trials at Creedmoor, L. I.	All classes rubber and gas			Frank Zaic, 100 E. 10th St., New York, N. Y.
August 1, September 1	Atlanta, Ga.	Labor Day Meet (AAA)	Gas & rubber	In excess of several hundred dollars		W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
September 14	Pittsburgh, Pa.	Sixth Allegheny Mountain Area Model Meet (AA)	Gas, rubber, cabin & stick & glider models	Merchandise	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
September 14	Denver, Col.	Record Trials for Exchange Gas Model Club (AA)	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
September 14	Silver Spring, Md.	Meet at White Oak Field (AA)	All types of outdoor models		Silver Spring Aeronauts	Louis B. Heat, 836 Sligo Ave., Silver Spring, Md.
September 20	Atlanta, Ga.	Aero Engineers Night Flying Contest (AA)	Sleak fly after contest Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
September 21	Pine Valley (Berlin), N. J.	Fall Gas Meet (AAA)	All classes gas, plus beauty & stunt event	Over $400 in prizes	South Jersey Gas Model Assn.	E. N. Angus, 24 Ormond St., Oaklyn, N. J.
September 27	New York City	A. M. A. Record Trials at Creedmoor, L. I.	All classes rubber and gliders			Frank Zaic, 100 E. 10th St., New York, N. Y.
October 5	Pittsburgh, Pa.	Allegheny Mountain Area Model Championships	Gas, rubber, cabin & stick & glider models	Merchandise awards	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.
October 5	Denver, Col.	Record Trials for Exchange Gas Model Club	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
October 5	Atlanta, Ga.	Aero Engineers Club Contest (AA)	Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
October 11	New York City	A. M. A. Record Trials at Creedmoor, L. I.	All classes rubber and gliders			Frank Zaic, 100 E. 10th St., New York, N. Y.

DATE	LOCATION	NAME OF MEET	EVENTS	PRIZES	SPONSOR	SECRETARY
July 20	Omaha, Neb.	Nebraska & Western Iowa Gas Model Airplane Contest (AAA)	Gas, all classes	Medals, trophies & merchandise	Omaha World-Herald	L. B. Bush, 410 Radick Tower Bldg., Omaha, Neb.
July 26	New York City	A. M. A. Record Trials at Creedmoor, L. I.	All classes rubber and gas			Frank Zaic, 100 E. 10th St., New York, N. Y.
July 27	Ottumwa, Iowa	Iowa-Midwestern Gas Model Contest (AAA)	All classes gas	$250 in cash, $150 in trophies		Claude McCullough, Rural Route 5, Ottumwa, Iowa
July 27	Linden, N. J.	Northern New Jersey Rubber Championships (AAA)	All classes rubber and gliders	Trophies & merchandise	Linden Model Aircraft Club	Frank Kryniak, 321 E. Price St., Linden, N. J.
July 27	Baltimore, Md.	4th Annual Contest of Baltimore Model Airplane Association (AAA)	All classes gas, beauty, event & rubber	Trophies & merchandise		Walter Coburn, Jr., 2911 E. Monument, Baltimore, Md.
July 27	Mayfield, N. Y.	Capitol District Aeronautical Association Seaplane Record Trials (AA)	All classes R. O. W. models			J. Paul Lusk, 204 Clinton St., Schenectady, N. Y.
July 27	Atlanta, Ga.	Aero Engineers Seaplane Contest (AA)				W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
August 3	Silver Spring, Md.	Meet at White Oaks Field (AA)	Gas, beauty, rubber & glider models	$100 in prizes	Silver Spring Aeronauts	Louis B. Heat, 836 Sligo Ave., Silver Spring, Md.
August 3	Atlanta, Ga.	Aero Engineers Club Contest (AA)	Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
August 10	Denver, Col.	Record Trials for Exchange Gas Model Club	Gas, all classes			Harry Bennett, 3405-07 East Colfax Ave., Denver
August 15, 16	St. Louis, Mo.	9th Annual Mississippi Valley Contest (AAA)	Indoor: stick, cabin & helicopter. Outdoor: all classes gas & rubber, cabin & stick	$400 in prizes	Shix, Baer & Fuller Model Airplane Club & Young Man's Division St. Louis Chamber of Commerce	R. H. Sommers, Shix, Baer & Fuller Dept. Store St. Louis, Mo.
August 16	Atlanta, Ga.	Aero Engineers Night Flying Contest (AA)	Sleak fly after contest. Gas, all classes			W. F. Roberts, 1115 Ponce de Leon Ave., N. E., Atlanta, Ga.
August 16, 17	Buffalo, N. Y.	Empire State Championships (AAA)	Gas, all classes, and Class D rubber	$600 in prizes		Howard E. Ruth, 1466 Genesee St., Buffalo, N. Y.
August 17	Pittsburgh, Pa.	Fifth Allegheny Mountain Area Model Meet (AA)	Gas, rubber, cabin & stick & gliders	Merchandise	Aero Club & Boys Club of Pittsburgh	Harry G. Vogler, 1633 Duffield St., Pittsburgh, Pa.

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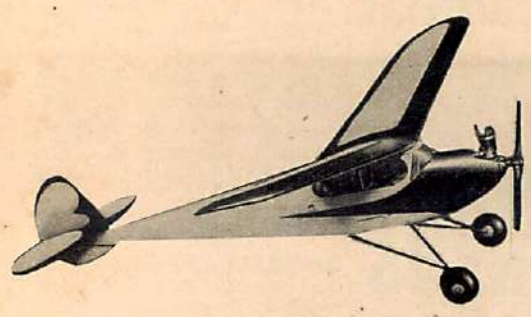

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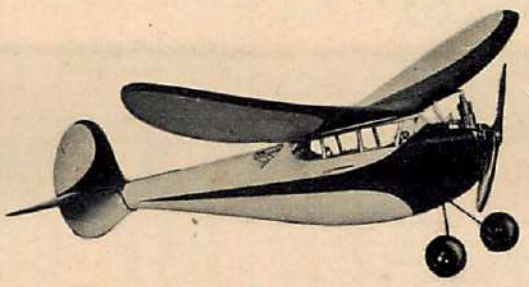

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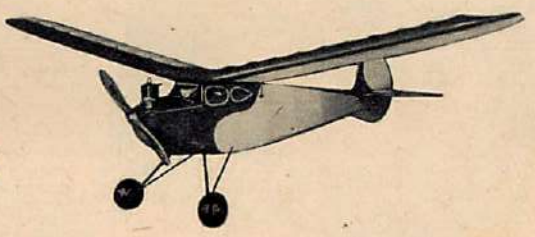

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Don't Quote Me

(Continued from page 43)

Manual Training Department of the New Orleans' city schools and the output was again stepped up. Encouraged by increased business, the company moved to larger quarters where merchandise might be displayed to greater advantage. After a few years in this line, Mod-Kraff ceased manufacturing and decided to job and retail the Megow line of merchandise. Today the firm occupies a portion of a business block with elaborate quarters designed à la industry, even including airplane wallpaper, balsa pigeonholes, et cetera.

Since Mr. Jumonville's brother left the business, Mr. Jumonville's sister has been in charge of the retail department, and according to New Orleans modelers, she really "knows her stuff" in regard to the game. The wholesale department is most complete and has a large stock for ready shipment throughout the country.

Last summer Mod-Kraff was appointed exclusive distributor for the Megow line in Louisiana, Mississippi, Alabama, West Florida and West Arkansas, and the territory is very adequately covered by salesmen of the firm. The accounts in this vast area are many in number and do a fine business. Business in 1940 increased more than sixty percent, and 1941 looks even better. In addition to the Megow line, the firm handles popular motors, race cars, and other accessories.

Mr. Jumonville attributes much of the credit for the firm's success to his capable sister. Of course, he is a model builder himself, and much of his pleasure is gained in promoting and sponsoring contests. He especially invites inquiries regarding his dealer business.

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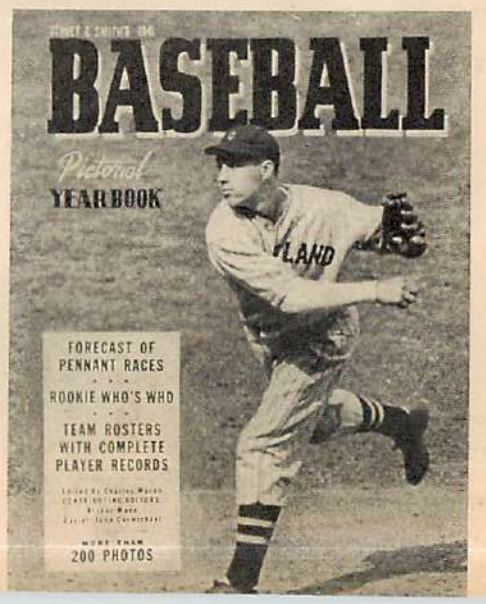

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